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Investigating the implications of Unemployment and Inflation for Income Inequality in Nigeria

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Abstract: *In developing countries, Nigeria inclusive, among the macroeconomic goals pursued by the government to ensure the well-being of the residents include attainment of full employment, price stability and equitable distribution of income. Available statistics in Nigeria reveal that income inequality level, unemployment and inflation rates have been increasing in recent years. This study examined the effect of increase in inflation and unemployment rates on income inequality in Nigeria for the period (1981-2023) using Autoregressive Distributed lag (ARDL) Bound Test Approach. The findings of the study show that both inflation and unemployment has significant positive relationship with income inequality in Nigeria. This implies that increase in inflation rate worsen income inequality problem in the country. It also indicates that increase in unemployment rate hikes income inequality level in the country. The interplay between unemployment, inflation and income inequality is a complex one in that if policymakers focus solely on maintaining low inflation, as directed by traditional Phillips curve it might inadvertently increase income inequality through high unemployment rate, and a policy that prioritizes on reducing unemployment level might hike inequality through high inflation rate. Hence, there is need for the government to adopt more adequate tools to fight inflationary pressure from different sources as well as curb unemployment. Among the recommendations include a judicious mix of monetary and fiscal strategies for achieving macroeconomic stability and inclusive economic development. Government policy should focus on increasing aggregate output in the economy through increase in productivity of the average worker and this can be achieved through lowering interest rate and provision of critical infrastructure especially electricity supply and road infrastructure to reduce cost of production and promote investment. Tax reduction is also recommended to stimulate consumption and investment spending, output and employment. Also, there should be increased government expenditure on education and health sectors as well as on social policies such as poverty alleviation and social protection.*

Keywords: Income inequality, inflation rate, unemployment rate, Nigeria

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INTRODUCTION

Income inequality is one of the major challenges facing the world economy, with high level social, economic, political and psychological consequences. In advanced economies, rising income inequality has been identified as one of the greatest challenges in recent times and has dominated the agenda of the World Economic Forum (WEF) where the world's top political and business leaders attended, undertook speeches on the gravity of income inequality and the need to address its increase. The global risks report, drawn from over 700 experts in attendance, pronounced inequality to be the greatest threat to world economy in 2017 (Elliot, 2017). In developing countries, Nigeria inclusive, income inequality has also remained a daunted issue. This is evidenced as the 10^{th} goal of the Sustainable Development Goals (SDP) has been dedicated to reducing income inequality. Consequently, investigating the causes and the effects of income inequality on the economy as well as the measures to mitigate its widening have been the increasingly concerned of policymakers, economists and multilateral institutions.

The increasing interest on income inequality emanated from its' vast negative socio-economic impacts on individuals and the society. Dabla-Norris et al (2015) maintained that widening income inequality has significant implications for economic growth, macroeconomic instability and social well-being. It can concentrate political power and decision-making power in the hand of a few individuals, leads to a sub-optimal use of human resources, reduce investment, cause political and economic instability and, raise crisis risk. Many studies have shown that beyond poverty and material deprivation often associated with low income, income inequality reduces economic growth, innovation and investment, impede social mobility, trigger social and political unrest, decrease aggregate demand and have negative impact on health and well-being of the people (Gingano, 2014; IMF, 2015; Dabla-Norris et al, 2015; Palacko, 2021).

High income inequality discourages investment and innovation as greater percentage of national wealth is concentrated in the hands of few in the upper income class leading to less spending power for the broader population and this tends to undermine economic activity. Palacko (2021) asserted that consumer spending is good for economic growth but rising income inequality shifts more money to the top of the income distribution. The individuals in the top income distribution group have smaller propensity to consume than those in the low-income group. The wealthy saves a good part of their income, whereas low income individuals may spend their entire income on consumer goods and services. Hence, high income inequality reduces consumption spending in the economy and consequently, reduces aggregate demand and economic growth.

Income inequality impedes social mobility by limiting the opportunities for upward economic mobility (Corak, 2013; Jensen & van Kersbergen, 2017). As wealth concentrates among the upper class, opportunities for individuals in the lower class to ascend the socio-economic ladder become slim. It may result in people in the low-income class having less access to quality education and healthcare, lack of opportunities for improved standard of living as well as creates a cycle of

poverty, which further perpetuates inequality across generations. Brown (2017) observed that as income inequality increases, there is a greater disparity in the resources that rich and poor parents invest in their children's education, which substantially affects the "cognitive development and school achievement". Also, unlike in inequitable income regions like UK, USA and Nigeria with different educational opportunities, where affluent parents are more likely to send their children to different private schools and fund other 'child enrichment' goods and services, children in more equitable income regions such as Scandinavia, have better access to resources, as they go to similar school, receive similar educational opportunities, and have access to a wide range of career options (Dorling, 2017). High income inequality is also associated with poorer health outcomes for the population due to limited access to quality healthcare.

In Nigeria, there is significant income inequality. A small percentage of the population controls a large share of national income. Wealth is concentrated among a small group of elites, through enabling factors such as corruption, unequal access to economic and political opportunities, and the dominance of the economy by the oil sector (Dode, 2025). The World Bank (2019) report shows that, except for few years, the Gini coefficient measure of income inequality in Nigeria assumed an increasing trend. The Gini coefficient was 34.18 in 1980, 38.68 in 1986, 50.0 in 1992, 51.9 in 1996, 53.0 in 1998. The Gini coefficient for 2004 was 42.93, 48.83 in 2010, 48.8 in 2016 and 35.10 in 2018. The average index point for Nigeria for the period (1985 – 2018) was 39.73 index points. In comparison, the world average was 35.68 index points based on data from 91countries while the average index points of Nigeria from 1980 to 2018 was 39.73 (World Bank, 2018). The average index points of Nigeria have not only exceeded the world average by 4.05 per cent, the deviation of income distribution in Nigeria from a perfectly equal distribution is about 40.0 per cent. This is relatively high, considering the correlation between income inequality and poverty incidence.

Many factors are responsible for income inequality. These factors are classified into global and country specific factors. The global factors include technological advancement, globalization and commodity price cycles. The country specific factors are those factors related to economic development and economic stability as well as domestic policies such as financial integration, redistributive fiscal policies, and liberalization and deregulation of labour and products markets (IMF, 2015). Income inequality also arises from unequal ownership of the means of production (land and capital) and unequal access to economic and social goods and services (Awoyemi, 2004). Similarly, it has been argued that the income of an individual is a function of his assets and, the employment and productivity of that capital. Therefore, inequality between groups could be as a result of inequality in possession of assets in the form of land, finance, education, and access to public infrastructure and social capital. The lack of access to any or all of these assets could serve as a factor to the widening inequality (Langer et al, 2007; Abraham, 2016).

High unemployment level and inflation rate is also believed to have contributed to widening income inequality in a country. Unemployment and inflation are issues that are central to both the social and economic life of many countries. They are among the staid impediments to socio-

economic progress in both developed and developing countries. In developing countries, Nigeria inclusive, unemployment and inflation constitute a vicious cycle that explains the endemic nature of poverty (CBN, 2013). In Nigeria, unemployment manifests in different dimensions and has been widespread, cutting across all categories of age groups, educational strata and geographical entities (Egunjobi, 2012). There are underemployment cases in which people receive money wage that are inadequate to support their basic needs, in terms of food, clothing and shelter. There are also cases of disguised unemployment where people take up jobs that are below their educational attainment, experiences, or do not suit their purpose and training. The worst case of all is the case of people that has the qualification, ability and willingness to work and search for job opportunities but cannot find any either in the public and the private sector. Worst still, some people are willing and ready to be self-employed; by setting up enterprises themselves and engage in one type of economic activity or the other but are constrained by harsh macroeconomic environment perpetuated by lack of electricity, poor road network, high interest rate, insecurity, corruption, poor political system and conflicting government policies.

Unemployment has remained a serious macroeconomic problem confronting the Nigerian economy because it amounts to waste of a country's manpower resources and loss of output by both individuals and the economy. It generates welfare loss and leads to low income and therefore, poverty and poor living standard. It creates dependency burden for those who are employed, which makes it difficult for them to save and in most cases, results in the phenomenon of the "working poor" (Umo, 2012). It ensures that economically active population remains poor and since the youth and women are mostly affected by unemployment, lack of employment means lack of ability to invest in human capital development as a mean of acquiring more marketable skills for the future. High unemployment, therefore, is believed to have disproportionately affected income inequality in Nigeria by reducing the income of those who are unemployed. In addition, prolonged unemployment can result in erosion of human capital, making it difficult for individuals to re-enter the workforce and earn competitive wages.

Similarly, inflation has significant effects on consumers, businesses, investors and overall economy. Though moderate inflation rate is necessary for a healthy economic activity in a country as it indicates that there is high demand for goods and services in the economy and this encourages businessmen to invest and expand businesses, leading to more employment, output and economic growth, high rate of inflation is inimical to economic growth. It erodes the purchasing power of money by reducing the amount of goods and services that can be purchased with a given amount of money. It reduces the purchasing power of consumers because a given amount of money will afford progressively less consumption. Inflation affects income inequality by increasing the price of essential goods and services in the economy and reducing the purchasing power of low-income groups thereby making them to spend a larger proportion of their incomes on necessities than those in the high-income group. This leads to an escalation of income inequality by further widening the disparity between the wealthier group and the less affluent (Michael, 2018).

Available statistics in Nigeria reveal that unemployment and inflation rates have been increasing in recent years. The unemployment rate was 18.1 per cent in 2000, 21.7 per cent in 2010, 33.3 per cent in 2020, 35.6 per cent in 2021, 37.7 per cent in 2022 and 41.7 per cent in 2023 (CBN, 2023). Also, there had been an upward trend of inflation rate in Nigeria. The inflation rate in Nigeria was 13.24 per cent in 2020, 16.95 per cent in 2021, 18.84 per cent in 2022 and 20.54 per cent in 2023 (CBN, 2023). Inflation and unemployment is believed to have contributed to income inequality in Nigeria. The objective of this study is to examine the impact of unemployment and inflation rates on income inequality in Nigeria for the period (1981 - 2023) using the Auto-regressive Distributive Lag (ARDL) model. This study was motivated by the upward trend of unemployment and inflation rates in recent years in Nigeria, their contributions to heightened misery and discomfort levels of the people and widening income inequality in Nigeria. This study argues that policies and programmes that will lead to drastic reduction in inflation and unemployment rates are quintessential to lessen income inequality in Nigeria.

LITERATURE REVIEW

Conceptual Issues

Income Inequality

Inequality is a broad based and multi-dimensional concept, involving pervasive disparities in income, wealth, education, healthcare, and political representation, among others. Dode (2025) conceptualized inequality as unequal distribution of resources, opportunities, and privileges among individuals and groups within the society. According to him, inequality is often perpetuated by system factors such as historical injustices, discriminatory practices and unequal policies, which can create barriers to social mobility and economic advancement. Inequality undermines economic stability, social cohesion and political stability and, leads to a cycle of poverty and underdevelopment. High levels of inequality can intensify social tensions, contribute to conflict and erode trust in institution. On the other hand, reducing inequality is capable of spurring economic growth and development, improving healthcare services and education, promoting political stability, for sustainable development to thrive.

Inequality is multifaceted in nature. Inequality can manifests in economic inequality, social inequality, political inequality and cultural inequality, vertical inequality and horizontal inequality, among others (Dode, 2025; Abraham, 2016). Economic inequality manifests in income inequality, disparity in wealth distribution, access to financial services, employment opportunities, etc. Income inequality refers to the disparity of income between wealthiest group and the poorest group in the society over time. It focuses on the average income and standard of living of average lower- and - middle class families in a country and compares it to that of the upper-class citizens. The vertical inequality is a measure of the general levels of inequality between the rich and the poor people in a society regardless of the ethnic affiliation or other group characteristics of the population (Stewart, 2000). Horizontal inequality, on the other hand, is inequality among constructed groups (Langer et al, 2007). Horizontal inequality provides insight into related

conditions across groups of individuals, usually along a number of dimensions. It is multidimensional, involving economic, political, and social dimensions. Horizontal inequality among groups could persist over a long period and, therefore can trap people, generation after generation, in a situation of poverty, giving rise to greater social instability (Langer et al, 2007).
Among the measures of income inequality include median share of income, calculation based on percentile distribution and quintile distribution, Robin Hood index, Hoover index, Theil's entropy measure, coefficient of variation, Lorenz curve and Gini index (Krol & Miedema, 2009; Abraham, 2016; Guza et al, 2020). All these measures (or indices) of income inequality have strength and weakness, however all are useful given a certain context. The most widely used of these indicators is the Gini index (or Gini coefficient) developed by an Italian statistician, Corrado Gini, in 1992. The range of measurement of Gini index is between 0 and 1 or 100, with the value 0 representing absolute equality, where everybody has the same income, while the value 1or 100 entails maximum inequality, where one person has all the income and others have none. Gini index measures the extent to which income distribution (or in some cases, consumption expenditure or wealth concentration) among individuals or households within an economy or society deviates from a perfectly equal distribution and can be used to compare the disparity of income between the wealthiest group and the poorest group in the society, and the levels of income inequality in a country at different times. As an indicator of income inequality, the Gini coefficient has been criticized for being more sensitive to changes in the middle of the distribution, rather than the tails where the focus should be placed. It has also been criticized for being difficult to interpret as different income distributions can have the same Gini coefficient.

Unemployment

Unemployment is an economic situation in a country where there are a large number of able-bodied persons of working age who are willing to work at the prevailing wage rate, searching for work but could not find work. The International Labour Organisation (ILO) describes the unemployed as the number of economically active population who are without work but available for and seeking work, including people who have lost their jobs and those who have voluntarily left work (World Bank, 1998). Unemployment, therefore, may be "voluntary" and "involuntary" (Iyoko, 2015). Voluntary unemployment involves people who choose not to work or accept jobs, for which they are qualified to do, at the prevailing wage rate and conditions, perharps because they have other means of livelihood besides employment. Involuntary unemployment, on the other hand, exists when people cannot get jobs even when they are willing to accept lower real wages or poorer conditions than workers of the same or similar qualifications that are currently in employment. Unemployment rate in an economy is the number of people unemployed, expressed as the percentage of the total labour force (Englama, 2001). The total labour force is defined as the summation of the number of people employed and the number of unemployed within the age bracket of 15 - 60 years. Therefore, as Adebayo (1999) opined, unemployment exists when members of labour force wish to work but cannot get jobs.

Unemployment in Nigeria can be broadly divided into open unemployment and disguised unemployment or underemployment (Onwioduokit, 2006). Open unemployment, as described by

Todaro (1992), exists when people who are able and often eager to work but for whom no suitable jobs are available. Disguised unemployment involves people who are normally working full time but whose productivity is so low that a reduction in hours of work would have negligible impact on total output. It is associated with the employment of labour whose marginal productivity is rather too small relative to the wage received. Oni (2006) defines underemployment as case in which people receive incomes that are inadequate to support their basic needs, in term of food, clothing and shelter.

Theoretically, the major types of unemployment have been identified as cyclical unemployment, frictional unemployment, structural unemployment and seasonal unemployment. There are also disguised unemployment and underemployment. Cyclical unemployment, also known as Keynesian and demand-deficient unemployment, is caused by a fall in aggregate demand or reduction in the level of total spending in the economy. When this happened, the economy may lack the capacity to create sufficient jobs for the labour force who wants to work. Cyclical unemployment is associated with a downturn in business cycle. It occurs mostly during periods of economic depression and recession. Periods of economic depression or recession is characterized by low economic activity, low income and decline in demand for goods and services. As demand for goods and services falls, production capacity of the economy will reduce, leading to massive lay-off of workers or a demand for fewer workers by business firms. However, cyclical unemployment is reversed as the economy recovers from recession and depression.

Frictional unemployment occurs when individuals are transitioning from one job to another and when there is a new entrant into the labour market, like those who just finished formal school or training. Therefore, frictional unemployment is associated with time-lag in moving from one job to another or seeking and finding job. The time-lag is caused by certain frictions in the economy like imperfect labour mobility, imperfect information on available jobs opportunities, breakdown of machinery and shortage of raw materials in factories, and inability of the economy to match job seekers with available jobs instantly and smoothly. Its existence is also related to issues like possession of requisite skills, amount paid as wages, work time, working conditions and location, attitude, taste, and a host of other factors. A major characteristic of frictional unemployment is that it is of short duration and as such is viewed as none problematic.

Structural unemployment is caused by structural changes in the economy. Structural changes in the economy are associated with technological change, globalization and change in demand pattern. Technological change creates unemployment when the adoption of modern production process and innovation involves the use of new machineries and inventions which displace the existing workers because their skills have become obsolete. It also creates unemployment when technological change involves replacing the old technology with new one that requires few workers than before. For example, adoption of technology-intensive methods of production will create demand for labours with specialized skills only while unskilled and semi-skilled labours are rendered unemployed. Structural change in the economy is also brought about by globalization and a change in demand pattern. Globalization merges countries of the world into a global village,

leading to exposure to new technology, new life style, new products and consumption pattern. Adoption of new technology often results in displacement of workers whose skills are not needed for available jobs. In the same vein, a change in demand pattern creates jobs for people whose skills are needed in production industry whose products are in high demand and unemployment for people whose skills are meant for production in firms where the demand for their products has declined. Structural unemployment poses serious problem as it is of longer duration because more time will be required for people to get new training to acquire new skills needed for available jobs. Secondly, structural unemployment involves people whose existing skills are no longer marketable. In order to get new jobs, structural unemployment will require people acquiring new skills through re-training.

Seasonal unemployment is loss of jobs associated with seasonal variations. It takes place in industries whose production in subject to seasonal variations. For instance, labour engaged in agriculture, tourism and construction industries will be temporary unemployed during some periods of the year. Seasonal unemployment is a kind of structural unemployment since it is associated with seasonal changes and is linked with certain types of jobs

Inflation

Inflation is a sustained increase in the general price level of goods and services in the economy. All economies of the world, developing, emerging and developed, have suffered from inflation at one time or the other. Inflation is measured in terms of price index. The price index is the average value of all price changes. Among the indexes employed in measuring inflation include Wholesale Price Index (WPI), Producer Price Index (PPI), Consumer Price Index (CPI) and Implicit Price Index (IPI) or GDP deflator (Richard, 2011). The most commonly used index and the index used in Nigeria is the CPI. CPI is designed to measure the average change in the retail prices that consumers pay. The CPI for any year is computed using Laspeyre formula and is obtained by relating the cost of the market basket in the year to the cost of the basket in the base year and, changes in the CPI are used to determine the inflation rate.

Theoretically, economists have classified inflation into demand-pull inflation, inflation due to excess demand resulting from excess growth in money supply, cost-push inflation, structural inflation and imported inflation (Ahuja, 2011; Richard, 2011, Blanchard, 2019). The demand-pull theory of inflation maintains that inflation occurs when aggregate quantity of goods and services demanded is rising faster than the aggregate supply of goods and services in the economy. It is the excess aggregate demand, due to increase in private consumers, investment and government spending, which could not be met by corresponding increase in aggregate supply because of resource gap, that pull-up prices and wages in the economy. This theory emphasizes the role of demand-side factors in shaping inflationary trends and, sheds light on the dynamics of consumption and investment within the country. Inflation is also attributed to excess demand resulting from excess growth rate in money supply (Richard, 2011). When the quantity of money supply in the economy increase without a corresponding increase in the supply of goods and

services, it may result in a situation "where too much money will be chasing too few good", leading to inflation.

The cost-push inflation theory, on the other hand, stresses that the increase in the cost of production is the main cause of inflation. An increase in wage rate due to trade union action and prices of other inputs of production like petroleum products and raw materials raise the cost of production of business firm. As production cost increases, the producers will adjust prices upward in an attempt to maintain profitability, thereby contributing to inflationary pressure. This theory provides insight on the important of supply-side dynamics, stressing the role of production inputs in shaping the overall price in the economy. The Keynesians theory acknowledges demand pull and cost push factors and postulate that increases in money supply indirectly influence the general price level through interest rates (Olasunkanmi, 2015). The classical theory of inflation, rooted on the quantity theory of money, posits that change in money supply is the major determinant of inflation. According to them, there is a direct and proportional relationship between money supply and the general price level. The argument against the classical theory is that it emphasizes the role of money supply in heightening inflationary pressure and ignores the roles of non-monetary factors which cause inflation, and is therefore, considered one-sided and incomplete.

The monetarist theory revives the classical monetarism in a modified form and postulates that inflation is a monetary phenomenon (Friedman, 1968). They believe that expansionary monetary policy increases output in the short-run. In the long-run, however, increase in money supply leads to increase in price level only and no effects on the real variables such real output, employment, etc. There is also the purchasing power parity theory of inflation which postulates that inflation is caused by the role of the exchange rate in the country, and this mostly occurs in a country where flexible exchange rate is practiced (Mankiw, 2007; Jhingan, 2012).

Imported inflation theory argues that increase in the prices of imports (final products and inputs of production) caused inflation, transmitted from one country to another as a result of international trade (Dictionary of Economics, 2025).While increase in the prices of imported final products will directly transmits to hike in domestic prices, increases in the prices of imported production inputs such as fuels, raw materials and other components of production will increase the domestic cost of production, and lead to increases in the prices of domestically produced goods. Therefore, imported inflation may be set-off by foreign price increases or by depreciation of a country's exchange rate. Further, the structural theory of inflation maintains that inflation is caused by structural inflexibilities in the economy which include poor harvest due to overdependence on changes in weather such as rainfall, as well as lack of storage facilities.

Theoretical Framework

The theoretical framework of this study draws strength from a contemporary hypothesis put forward by Rolim, Carvalho, and Lang in 2023, christened inequality - augmented Phillips curve (hereafter IAPC). The IAPC is a combination of the Phillips curve and the unemployment - inequality curve incorporated in one model. It extends the traditional Phillips curve to incorporate

the impact of inflation and unemployment on income inequality, thereby established a three dimensional relationship which links inflation, unemployment and income inequality.

The Phillips curve was developed in 1958 by A. W. Phillips, a Keynesians economist, when he studied the relationship between the rate of wage increases (wage inflation) and the level of unemployment in Great Britain between 1861 and 1957 and, was later expanded in the 1960s by Paul Samuelson and Robert Solow to reflect the relationship between inflation and unemployment. The Phillips curve relates unemployment and inflation and posits an inverse relationship between the level of inflation rate and the level of unemployment rate. The thrust of this theory is that economic growth is accompanied by inflation and leads to more jobs and less unemployment. The potential economic policy implication of the Phillips curve is that the government can used fiscal and monetary policy to steer economic growth and consequently, achieve full employment at the cost of high inflation level, or lower inflation at the cost of lowered employment.

The unemployment-inequality curve, on the other hand, relates unemployment and income inequality and posits positive relationship between unemployment and income inequality (da Silva etal, 2022; Mocan, 1999). The positive relationship can be explained by direct effect of unemployment on income inequality and its indirect effect through wage inequality. Based on the Phillips curve, the unemployment rate appears as the key variable which determines the level of inflation rate. Also, through the unemployment-inequality curve, the unemployment rate appears as an important determinant of income inequality. The unemployment rate therefore, connects the inflation rate to income inequality in a three dimensional relationship described by the IAPC (Rolim, 2024). The IAPC indicates the possibility of a trade-off between low inflation rate and low income inequality, in addition to the widely acclaimed trade-off between low inflation and low unemployment provided by the traditional Phillips curve. Higher unemployment is linked to both lower inflation and higher income inequality while lower unemployment could lead to higher inflation but potentially low income inequality.

The positive relationship between unemployment and income inequality posited by unemployment-inequality curve is supported by the empirically established counter-cyclical Gini coefficient in many studies, including Hoover et al, 2009; Maetei & Roventini, 2012. This relationship is as a result of diverse impact of business cycle on low - income workers. Many studies including (Mitchell et al, 1985, Sanusi, 2016) have shown that low-wage workers, unskilled workers, young workers, and less educated workers face larger fluctuations in their unemployment rates.

Empirical Literature Review

Studies on the relationship between inflation, unemployment and inequality have yield mixed results, suggesting that the impact of these factors can vary depending on the specific context and the level of inflation and unemployment. Some studies have found a positive relationship between inflation and income inequality while others have a negative or even u-shaped relationship. Monnin (2014) explored the empirical link between income inequality and inflation in ten OECD

countries (Australia, Canada, Denmark, France, Japan, New Zealand, Norway, Sweden, United Kingdom, and the United States) for the period (1971-2010) using balanced panel analysis. In addition to inflation, six control variables: economic development level, business cycles, unemployment, unionization, openness to international trade, and skilled based technological change were included in the model. The results show a U-shaped link between long-run inflation and income inequality. As inflation increases, inequality decreases, reach a minimum with an inflation of about13%, and then starts to rising again. In this study, the precise mechanism that made more inflation to correlate with a decrease in income inequality until a certain threshold is not clear.

Fauzan, et al (2023) studied the relationship between income inequality, economic growth, inflation and unemployment in West Java Province using panel data analysis, Ordinary Least Squares (OLS) and generalized least squares (GLS) models. The results of the panel data analysis indicated that income inequality, inflation, and unemployment have significant negative effect on economic growth. The regression result shows that income inequality significantly affects unemployment, while economic growth and inflation have a significant positive effect on unemployment. Shabnum & Malik (2023) examined the impact of inflation and unemployment on income inequality in Pakistan for the period (1980 - 2020) using logit model. The results show that all selected variables had significance impact on income inequality in Pakistan; inflation and unemployment have negative impact on income inequality while GDP growth rate has positive influence on income inequality.

Bulir (2008) examined the nexus between inequality and inflation in India for the period (1971 - 2006), using a fully modified Ordinary Least Square (FMOLS) model within the framework of Kuznets hypothesis and found that the impact of price stability on income distribution was nonlinear. The study concluded that the reduction in inflation from hyperinflationary levels significantly lowers income inequality. This finding corroborates with the predictions of economic theory that inflation exerts an adverse effect on workers with fixed income and savers. Thus, salaried workers, lenders, and net savers would be worse off during inflation. Agim & Okorie (2020) explored the determinants of income inequality in Nigeria for the period (1995 - 2020) using Vector Error Correction Model (VECM) and found that in the long-run unemployment, personal income tax and corruption have statistically significant impact on income inequality in Nigeria.

METHODOLOGY

This study is empirical and makes use of secondary data. A quasi-experimental design was adopted to establish the cause-effect relationships among the variables. The data were collected from the Statistical Bulletin of the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS) and the World Development indicators (WDI) of the World Bank. The data collected were subjected to unit root test to examine the stationarity property of the variables and a co-integration test to ascertain the existence of a long-run relationship of the variables. The Auto-regressive Distributive

Lag (ARDL) model proposed by Pesaran et.al (2001) was adopted to examine the nature of the short-run and long-run relationship between the variables.

Model Specification

To capture the impact of unemployment and inflation on income inequality in Nigeria, empirical model is formulated in mathematical form thus:

INQ = f (INF, UNEM, RGDPPC, LR, MR, FD) - - - (1)

Equation (1) states that income inequality (INQ) proxied by Gini Coefficient (GINI) is a function of inflation rate (INF), unemployment rate (UEM), real GDP per capita (RGDPPC), literacy rate (LR), migrant remittance (MR), and financial development (FD). The variables of interest in this study are income inequality (INQ), inflation rate (INF) and unemployment rate (UEM) while other variables are control variables. In order to bring the variables to same unit, the variables were transformed to their logarithm for estimation. In econometric form, the model is stated as follows:

$\ln INQ = \beta_0 + \beta_1 \ln INF + \beta_2 \ln UEM + \beta_3 \ln RGDPPC + \beta_4 \ln LR + \beta_5 \ln MR + \beta_6 \ln FD + \mu$ - - (2)

β_0 is constant term, μ is error term which captures all other factors not accounted for in the regression model while β_1,- - -, β_6 are parameters for estimation. They are measures of marginal effect of the explanatory variables on the dependent variable. A priori expectation is as follows: β_1 and $\beta_2 > 0$ while β_3, β_4, β_5 and $\beta_6 < 0$.

Estimation Technique

Time series data for the period (1981 - 2023) were used for the estimation of the model. The estimation of the model was carried out in three steps. The first step involved carrying out the Augmented Dickey-Fuller (ADF) unit test to check the stationarity property of each of the variables to ensure that the variables possess empirical characteristics that would guarantee convergence to equilibrium in the long-run, thereby overcomes the possibilities of spurious correlation of the variables in the model. The ADF test involves estimating the equation (Gujarati & Sangeetha, 2007):

$$\Delta Y_t = \alpha_1 + \alpha_{2t} + \beta Y_{t-1} + \Sigma^m_{i=1}(\theta i \Delta Y_{t-1}) + \mu_t \quad - - - (3)$$

In equation (3), Y is a time series, Δ is the difference operator, t is a linear time trend, and μ is a pure noise error term, α_1 is a constant, α_2 and β are parameters to be estimated and $\Delta Y_{t-1} = Y_{t-1} - Y_{t-2}$, $\Delta Y_{t-2} = Y_{t-2} - Y_{t-3}$, etc. The null hypothesis, H_0 states that there is a unit root (that is, non-stationary, $\beta = 0$) and the alternative hypothesis, H_1 states that there is stationarity (absence of unit root in the series, $\beta < 0$). Thus, the decision rule is to reject H_0, if the ADF t-statistic is less than the reported ADF critical value at a chosen level of significance. If otherwise, H_0 is accepted.

The second step of the estimation process involved conducting cointegration test to establish whether long-run equilibrium relationship exists among the variables or not. The autoregressive distributed lag (ARDL) cointegration technique was used. The ARDL method is considered the best compared to other econometric methods in a case where the variables are stationary at I(0), I(1) or has a mixed of I(0) and I(1). However, this technique will crash if integrated order of I(2) is present. The existence of long-run relationship of the variables was tested by using Wald test to

compute the Bound F-statistic and established when the F-statistics exceeds the critical bound values.

When the existence of cointegration is established, the third step involves estimating the long-run ARDL model for IEQ. The ARDL model contains the lagged value of the dependent variable (IEQ) and the current and lagged values of regressors (INF, UNEM, RGDPPC, LR, MR, FD) as explanatory variables. Therefore, equation (3) can be written in ARDL form as follows:

$$\Delta \ln IEQ_t = a_o + \Sigma a_1 \Delta \ln IEQ_{t-1} + \Sigma a_2 \Delta \ln INF_{t-1} + \Sigma a_3 \Delta \ln UNEM_{t-1} + \Sigma a_4 \Delta \ln RGDPPC_{t-1} + \Sigma a_5 \Delta \ln LR_{t-1} + \Sigma a_6 \Delta \ln MR_{t-1} + \Sigma a_7 \Delta \ln FD_{t-1} + b_1 \ln IEQ_{t-1} + b_2 \ln INF_{t-1} + b_3 \ln UNEM_{t-1} + b_4 \ln RGDPPC_{t-1} + b_5 \ln LRNF_{t-1} + b_6 \ln MR_{t-1} + b_7 \ln FD_{t-1} + \varepsilon_t \quad - - - (4)$$

In equation (4), a_o represents the drift component, Δ is the first-difference operator, a_i is long-run multipliers, b_i is short-run dynamic coefficients and ε_t is the white noise.

PRESENTATION AND ANALYSIS OF EMPIRICAL RESULT

Descriptive Statistics

The descriptive statistics of the variables of the study are presented in Table 1. The mean of IEQ was 46.94 while the mean of inflation and unemployment rates were 19.05 and 13.35 respectively. The maximum and minimum values of IEQ were 60.30 and 36.70 respectively. While maximum value of unemployment rate was 41.70, the minimum value was 1.90. The maximum value of inflation rate was 72.84 and the minimum value was 3.94.

Table 1: Descriptive Statistics Result

	IEQ	RGDPPC	FD	INF	LR_	MR	UNEM
Mean	46.9398	2284.871	12.055	19.04585	59.3671	2.89168	13.3463
Median	45.1000	1882.200	8.620	13.01000	56.6700	2.19134	12.7000
Maximum	69.3000	15773.70	22.750	72.84000	78.4000	8.31190	41.7000
Minimum	36.7000	1408.200	5.810	5.390000	34.0000	0.00488	1.90000
Std. Dev.	8.08635	2209.004	5.733	16.62177	12.2900	2.54527	10.0788
Skewness	1.21864	5.740523	0.470	1.851801	0.0302	0.2776	1.09647
Kurtosis	4.02510	35.63512	1.436	5.311438	1.7981	1.6949	3.83710
Jarque-Bera	11.9432	2044.645	5.691	32.55983	2.4740	3.4365	9.41251
Probability	0.00255	0.000000	0.058	0.000000	0.2903	0.1794	0.00904
Sum	1924.53	93679.70	494.240	780.8800	2434.05	118.559	547.200
Sum Sq. Dev.	2615.56	1.95E+08	1314.47	11051.32	6041.79	259.136	4063.30
Observations	41	41	41	41	41	41	41

Source: Author's Computation

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Unit Root Test Result

The result of ADF unit root test is presented in Table 2. The result reveals that both the dependent variable, lnIEQ and all the explanatory variables (RGDPPC, FD, INF, LR, UME and MR) in the estimated model were stationary at the first level difference, I(I). This implied that the series data were stationary at first difference, I(I) and the behaviour of the variables varied around the mean value and invariant overtime (Enders, 2009). The fact that all the variables in model had the same order of integration of one, I(I), provides support for adopting the ARDL Bounds method of cointegration test to ascertain the long run relationship between the variables.

Table 2: Unit Root Test Result

VARIABLE	ADF STATISTICS	MACKINNON CRITICAL VALUES			LEVEL OF INTEGRATION	PREDICTION
		@1%	@5%	@10%		
IEQ	-3.1569	-3.0886	-3.1569	-2.9251	I(1)	Stationary
RGDPPC	-9.7031	-9.8516	-9.7031	-9.9991	I(1)	Stationary
FD	-5.9446	-5.9934	-5.9446	-5.8608	I(1)	Stationary
INF	-3.0135	-3.0314	-3.0135	-3.0818	I(1)	Stationary
LR	-10.9216	-11.2673	-10.9216	-1.4224	I(1)	Stationary
UME	-6.2337	-5.9674	-6.2337	-5.6842	I(1)	Stationary
MR	-6.6491	-6.7319	-6.6491	-6.7518	I(1)	Stationary

Source: Author's Computation.

Co-integration Test result

The ARDL cointegration test results are presented in Table 3. The results show the F - statistic value of 3.962971, which is greater than the lower and upper bound critical value at 2.5%, 5% and 10% level of significance. This confirms the existence of a long-run relationship between the macroeconomic variables estimated in the model.

Table 3: ARDL Bounds Test for Cointegration Result

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n = 100		
F-statistic	3.962971	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Source: Author's Computation

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Analysis of ARDL Regression Result

Long-run ARDL Regression Results

The long-run ARDL result is presented in Table 4. The results show that the coefficient of inflation rate (INF) has a positive sign of 0.317, in line with a priori expectation which suggests a positive and significant effect of inflation rate on income inequality (IEQ). This implies that a 1.0 per cent increase in inflation rate will result 31.65 per cent increase in income inequality. The coefficient of unemployment rate (UNEM) has a positive sign of 0.578, in line with the a priori expectation, which suggests that unemployment rate has a positive and significant impact on income inequality (IEQ). This means that 1.0 per cent increase in unemployment rate will result in 37.8 per cent increase in income inequality. As for the control variables, financial development (FD) had significant negative relationship with income inequality (IEQ) while migrant remittance (MR) had insignificant negative relationship with income inequality (IEQ). On the other hand, literacy rate (LR) displayed positive and significant effect on income inequality (IEQ) while real GDP per capita (RGDPPC) had negative but insignificant impact on income inequality (IEQ).

Table 4: Long-run Autoregressive Distributed Lag Model Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDPPC	0.000115	0.000296	0.387990	0.7081
INF	0.316467	0.036257	8.728486	0.0000
UNE	0.577948	0.099543	5.806023	0.0004
FD	-0.741436	0.231304	-3.205468	0.0125
LR	0.560402	0.152749	3.668777	0.0063
MR	-0.895356	0.476830	-1.877728	0.0972
C	14.16382	5.944598	2.382638	0.0444

EC = IEF - (0.0001*RGDPPC + 0.3165*INF + 0.5779*UNE -0.7414*FD + 0.5604*LR – 0.8954*MR + 14.16382)

Source: Author's Computation

Short-run ARDL Regression Results

The short-run ARDL result is presented in Table 5. The coefficient of one-year lagged of unemployment rate, ln(UEM(-1)) has a negative sign, which indicates a negative and insignificant effect on income inequality. Similarly, the coefficient of one-year lagged inflation rate has negative but insignificant impact on income inequality. As for the control variables, one-year lagged of financial development, ln(FD(-1)) exerted positive and significant effect on income inequality. The coefficients of ln(RGDPPC), ln(LR) and ln(MR(-1)) indicate negative and insignificant impact on income inequality. The value of coefficient of determination, R^2 is 0.933938. This

indicates that about 93 per cent of the total variation in income inequality is jointly explained by the explanatory variables. It shows the goodness of fit. The value of adjusted coefficient of determination, adjusted R^2 is 0.900012. This shows that the explanatory variables cumulatively determined about 90 per cent of the total variation in income inequality as well as re-affirms the goodness of fit. The F-statistic, 1079.651, which measures the overall significance of the estimated model, shows significance. This reinforced the goodness of fit.

Table 5: Short Run Autoregressive Distributed Lag Model Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	66.39077	7.141060	9.297047	0.0114
ln(IEQ(-1))	1.646830	0.321224	5.126732	0.0360
ln(FD(-1))	2.328320	0.372830	6.244994	0.0247
ln(RGDPC)	-0.000168	5.00E-05	-3.367725	0.0780
ln(INF(-1))	-0.044277	0.016446	-2.692199	0.1147
ln(LR_)	-0.618472	0.446051	-1.386551	0.2999
ln(MR(-1))	4.454011	0.819141	5.437417	0.0322
ln(UEM(-1))	-0.221920	0.057874	-3.834549	0.0618

R-squared	0.933938	Mean dependent var	48.88212
Adjusted R-squared	0.900012	S.D. dependent var	7.829242
S.E. of regression	0.246082	Akaike info criterion	-0.890880
Sum squared resid	0.121112	Schwarz criterion	0.514930
Log likelihood	45.69953	Hannan-Quinn criter.	-0.417868
F-statistic	1079.651	Durbin-Watson stat	3.204689
Prob(F-statistic)	0.000926		

Source: Author's Computation

Granger Causality Test

The existence of a relationship between the variables does not prove causality or the direction of influence (Gujarati, & Sangeetha, 2007). The essence of causality analysis in this study, using the granger causality test, is to ascertain whether a causal relationship exist between inflation rate, unemployment rate and income inequality in Nigeria and to also ascertain the direction of causality. The common rule of thumb for granger causality states that the null hypothesis (H_0) should be rejected if the reported probability value is less than 0.05 (the level of significance). The results of Pair-Wise Granger causality test is presented in Table 6. Based on the probability values of 0.7862 and 0.1177, which are greater than 0.05, the significance level, inflation rate (INF) does not Granger cause income inequality (IEQ) and unemployment rate (UNE) does not Granger cause income inequality (IEQ). It is concluded that there is no causality relationship between UEM and IEQ, and between INF and IEQ.

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Table 6: Pairwise Granger Causality Tests
Date: 10/22/24 Time: 18:13
Sample: 1981 2023
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
INF does not Granger Cause IEQ	41	0.02293	0.9773
IEQ does not Granger Cause INF		0.24212	0.7862
UNE does not Granger Cause IEQ	41	2.27225	0.1177
IEQ does not Granger Cause UNE		2.68326	0.0820

Source: Author's Computation

Diagnostic Test Results

Autocorrelation Test Result: The Durbin-Watson (DW) value of 3.204689 is greater than 2, hence there is absence of autocorrelation.

Normality Test Result: The Jarque-Bera normality test was conducted to ascertain whether the data set was well modelled by a normal distribution using histogram-normality test. The result presented in Figure 1 below shows a probability value of 0.616029, which is greater than 0.5. The result indicates that the residual of the model was normally distributed.

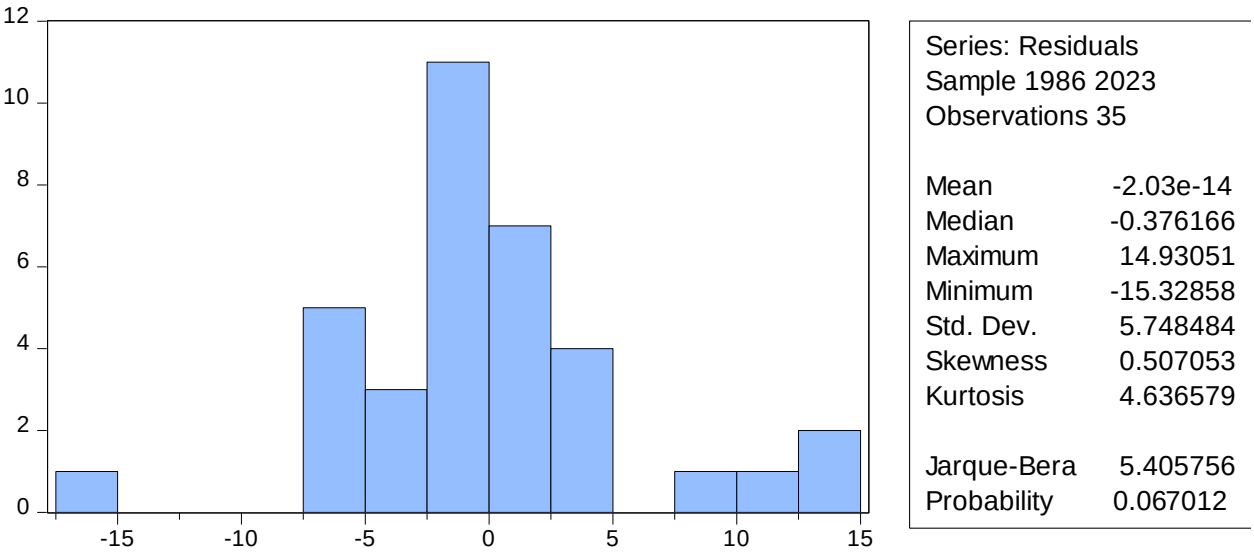

Figure 1: Results of Jarque-Bera Normality Test

Stability Test Results: The cumulative sum (CUSUM) test of recursive residuals and the CUSUM of square (CUSUMSQ) tests were applied to assess the parameter stability. The CUSUM test identifies systematic changes in the regression coefficients, while the CUSUMSQ test detects sudden changes from the constancy of the regression coefficients. Figure 1 and 2 plots the results for CUSUM and CUSUMSQ tests. The CUSUM test result indicates the absence of any instability of the coefficients as the plots of the CUSUM statistics fall inside the critical bands of the 5% confidence intervals of parameter stability, Therefore, the coefficients were stable over the sample period under study. The CUSUMSQ shows a mild stability at 5% level of confidence as the plot is a bit out of the critical bands of the 5% confidence.

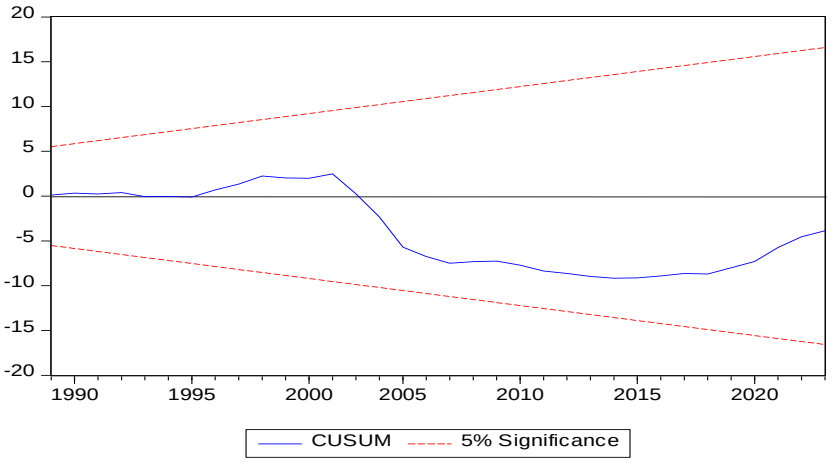

Figure 1: The Result of CUSUM tests for Parameter Stability

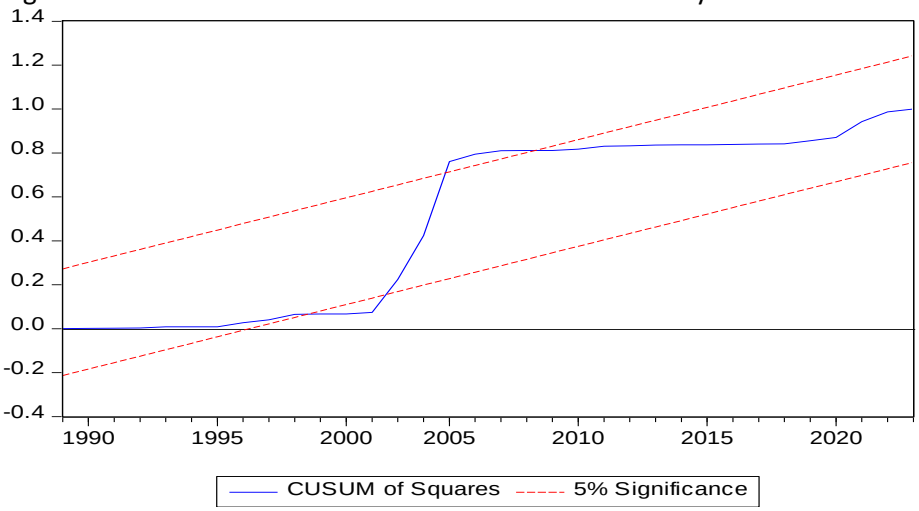

Figure 2: The Result of CUSUMSQ tests for Parameter Stability

SUMMARY, CONCLUSION AND RECOMMENDATIONS

The study examined the effect of inflation and unemployment on income inequality in Nigeria for the period (1981-2023) using Autoregressive distributed lag (ARDL) Bound Test Approach of analysis. The result of the study revealed a significant positive relationship between inflation and income inequality in Nigeria. The sign of coefficient of inflation rate was in tandem with a priori expectation. This implies that increase in inflation rate worsen income inequality problem in the country. Similarly, the study showed a positive and significant relationship between unemployment and income inequality in Nigeria. The sign of coefficient of unemployment rate is line with a priori expectation. This implies that increase in unemployment rate hikes income inequality level in the country. The results conform to economic theory.

The F-statistic, 1079.651, is greater than the F-tabulated at 0.05 level of significant, measures the overall significance of the estimated model. It indicates that the explanatory variables are jointly significant in explaining changes in income inequality in Nigeria during the period under study. This reinforced the goodness of fit. More so, the coefficient of determination (R^2) shows that all the variables jointly account for changes in income inequality to the tune of about 93%, while the remaining 7% were explained by variables not capture in the model but are taken care of by the error term. Also, the adjusted R^2 of 90% reaffirmed the goodness of fit. Based on the findings of this study, it is concluded that inflation and unemployment are positively related to income inequality in Nigeria for the period under study. The implication is that high inflation and unemployment rates worsened income inequality in Nigeria.

The interplay between unemployment, inflation and income inequality is a complex one in that as directed by traditional Phillips curve, if policymakers focus solely on maintaining low inflation, it might inadvertently increase income inequality through high unemployment rate, and a policy that prioritizes on reducing unemployment level might hike inequality through high inflation rate. Hence, there is need for the government to adopt more adequate tools to fight inflationary pressure from different sources as well as curb unemployment. A judicious mix of monetary and fiscal strategies for achieving price stability and inclusive economic development is recommended. Also government policy should focus on increasing aggregate output in the economy through increase in productivity of the average worker and this can be achieved through low interest rate, tax cuts and provision of critical infrastructure especially electricity supply and road infrastructure to reduce cost of production and promote investment. Also, there should be increased government expenditure on education and health sectors as well as on social policies such as poverty alleviation and social protection.

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