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Financial Inclusion, Unemployment, Poverty and Public Debt Dynamics in Nigeria: Evidence from Cointegration and Vector Error Correction Model

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Abstract

This study examines the long-run relationships and short-run adjustment dynamics among financial inclusion, unemployment, poverty, and public debt in Nigeria using annual time series data spanning 1990 to 2023. Given the non-stationary nature of the variables, the analysis employs the Augmented Dickey–Fuller unit root test, Johansen cointegration technique, Fully Modified Ordinary Least Squares (FMOLS), and Vector Error Correction Model (VECM) within a multivariate time-series framework. The results confirm that all variables are integrated of order one and exhibit a stable long-run equilibrium relationship. The FMOLS estimates indicate that financial inclusion and public debt are negatively associated with unemployment in the long run, while poverty is positively associated with unemployment. The VECM results further reveal the presence of short-run adjustment dynamics toward the long-run equilibrium following temporary shocks. These findings highlight the interconnected nature of financial inclusion, fiscal conditions, and social welfare indicators in shaping labour market outcomes. The study contributes to the literature by providing a unified empirical framework that captures both equilibrium relationships and dynamic adjustments among key macroeconomic variables in Nigeria. Policy implications should be interpreted within the context of long-run macroeconomic coordination rather than direct causal effects, particularly with respect to financial inclusion strategies, debt management, and poverty reduction efforts.

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1. Introduction

The rising rate of unemployment remains a persistent global concern, with particularly severe implications for developing economies such as Nigeria, where it contributes significantly to rising poverty levels, weak productivity, and structural economic imbalances (World Bank, 2024; United Nations, 2024). In response, policymakers have increasingly emphasised financial inclusion as a strategic mechanism for improving access to financial services, promoting entrepreneurial activity, and enhancing economic participation. In Nigeria, efforts to expand financial inclusion have been supported through collaborations between government institutions and the private sector, particularly via domestic credit expansion aimed at reaching underserved and unbanked populations, including those in rural and informal sectors.

While financial inclusion is often discussed as a potential instrument for improving labour market outcomes, unemployment dynamics are inherently multifaceted and may also be shaped by broader macroeconomic and structural factors, including poverty conditions and the evolving public debt profile. Existing empirical studies have largely examined the relationship between financial inclusion and unemployment in isolation, without adequately accounting for the potential interdependence between financial access, fiscal conditions, and social welfare indicators (El-Bourainy and Salah, 2021). This omission limits the ability to capture the broader macroeconomic environment within which labour market outcomes are determined and motivates the need for a more integrated analytical framework.

Globally, poverty remains a critical development challenge. It is estimated that approximately 1.3 billion people were affected by multidimensional poverty in 2020, with a substantial proportion concentrated in rural regions of Africa (Chen et al., 2021). Poverty, defined as the inability to meet basic human needs, manifests in both absolute and relative forms, reflecting varying degrees of deprivation across populations (Cloete, 2002). In parallel, public debt has emerged as an important macroeconomic variable influencing national economic performance. Public debt represents accumulated government obligations arising from internal and external borrowing, often used to finance development expenditures and stabilise economic activity (Matiti, 2013). However, in the context of Nigeria, rising debt levels, estimated at over 108.23 billion US dollars in the fourth quarter of 2023, raise concerns regarding fiscal sustainability and the efficiency of debt utilisation in supporting employment-generating activities (Debt Management Office, 2024).

The global policy agenda, particularly within the framework of the Sustainable Development Goals (SDGs), underscores the importance of financial inclusion, poverty reduction, and employment generation as interconnected development priorities. Financial inclusion, which gained prominence in the early 2000s, is widely viewed as a pathway to reducing poverty by improving access to financial services for underserved populations (Demirguc-Kunt et al., 2017). Despite these efforts, a significant proportion of the global population, estimated at 1.7 billion adults, remains financially excluded (Rani et al., 2021). In Africa, where demographic expansion is rapid and the youth population continues to grow, the challenge of generating sustainable employment opportunities remains substantial.

Although some evidence suggests a gradual decline in youth unemployment rates across the

continent, structural constraints continue to limit the capacity of economies to absorb the expanding labour force.

Recent global shocks, including the COVID-19 pandemic, have further exacerbated labour market vulnerabilities. Employment losses and rising income inequality have been particularly pronounced in developing economies, reinforcing the importance of inclusive financial systems in supporting resilience and recovery (Ozili, 2024). Financial inclusion can facilitate income generation, enhance consumption smoothing, and support investment in productive activities, thereby contributing indirectly to labour market outcomes. However, the extent to which these relationships manifest in the presence of persistent poverty and rising public debt remains insufficiently understood within the Nigerian context.

Despite growing empirical interest in the relationship between financial inclusion and unemployment, prior studies have produced mixed findings and often rely on methodologies that do not adequately capture the dynamic and long-run interactions among macroeconomic variables (El-Bourainy and Salah, 2021; Ozili, 2024; Wibowo et al., 2023). More importantly, the existing literature has not sufficiently examined the joint behaviour of financial inclusion, poverty, and public debt within a unified time-series framework. Given that these variables may exhibit non-stationary properties and long-run equilibrium relationships, an analytical approach that incorporates both long-run associations and short-run adjustment mechanisms is required.

Accordingly, this study contributes to the literature by adopting a multivariate time-series framework that integrates cointegration analysis, Fully Modified Ordinary Least Squares (FMOLS), and Vector Error Correction Model (VECM) to examine the interrelationships among financial inclusion, unemployment, poverty, and public debt in Nigeria. Rather than treating these variables as isolated determinants, the study models them as a jointly evolving system, thereby providing a more comprehensive understanding of their long-run equilibrium relationships and short-run dynamics.

In line with this objective, and consistent with the formulation of long-run hypotheses, the study is guided by the following research questions:

1. What is the nature of the long-run relationship between financial inclusion and unemployment in Nigeria?

2. How is public debt associated with unemployment in the long run within the Nigerian economy?

3. What is the long-run relationship between poverty and unemployment in Nigeria?

To complement these long-run relationships, the study further examines the short-run adjustment dynamics among the variables within a vector error correction framework, thereby capturing how deviations from long-run equilibrium are corrected over time.

By addressing these questions, the study provides new empirical insights into the interconnected dynamics of financial access, fiscal conditions, and labour market outcomes, offering a more coherent basis for interpreting macroeconomic interactions in Nigeria and similar developing economies.

2. Literature Review and Hypothesis Development

This study is anchored on three complementary theoretical perspectives: the financial literacy theory of financial inclusion, the Keynesian theory of public debt, and the liberal theory of poverty and unemployment. These frameworks collectively provide a conceptual basis for understanding the potential interrelationships among financial inclusion, unemployment, poverty, and public debt within a macroeconomic system.

The financial literacy theory of financial inclusion emphasises the role of access to financial knowledge and services in enhancing economic participation and welfare outcomes. According to (Ozili, 2020), financial inclusion improves individuals' ability to utilise formal financial systems, thereby facilitating savings mobilisation, access to credit, and investment in productive activities. Rather than directly generating employment, financial inclusion operates through indirect channels such as entrepreneurial financing, small business expansion, and improved resource allocation, which may be associated with labour market outcomes over time. This perspective suggests that financial inclusion may be linked to unemployment through broader economic mechanisms rather than immediate causal effects.

The Keynesian theory of public debt posits that government borrowing can stimulate aggregate demand, particularly when directed toward productive investments such as infrastructure and public services, thereby supporting economic activity and employment creation (Jefferson, 2012). However, the effectiveness of public debt in influencing labour market outcomes depends critically on the efficiency of resource allocation and the sustainability of fiscal policy. In contexts where borrowed funds are not channelled into productive sectors, rising debt levels may not translate into improved employment conditions. This implies that the relationship between public debt and unemployment is likely to be complex and context-dependent, potentially exhibiting varying long-run associations.

The liberal theory of poverty and unemployment highlights the structural linkages between labour market conditions and poverty outcomes, emphasising that unemployment and market inefficiencies can exacerbate poverty levels, particularly among vulnerable populations (Jefferson, 2012). Conversely, persistent poverty may also constrain access to education, skills development, and financial resources, thereby reinforcing unemployment dynamics. This bidirectional interaction underscores the importance of examining poverty and unemployment within a unified analytical framework.

Empirically, the relationship between poverty and unemployment remains inconclusive. Studies such as (Ariski et al., 2022) and (Mg et al., 2019) provide evidence of a positive association between unemployment and poverty, while (Murjani, 2018) confirms that increases in unemployment contribute to rising poverty levels using an ARDL framework. However, other studies report mixed or insignificant relationships (Dahliah and Nur, 2021; Ani, 2019), and some findings even suggest negative or weak associations (Probosiwi, 2016; Iwuoha, 2020). These divergent results indicate that the interaction between poverty and unemployment may depend on country-specific conditions and methodological approaches.

Similarly, the relationship between public debt and unemployment has produced mixed evi-

dence in the literature. Using time series data for Nigeria, (Iwuoha, 2020) employed a VECM framework and found evidence of cointegration and an inverse long-run association between public debt and unemployment, although the study also suggests limited effectiveness of debt in reducing unemployment. In contrast, (Ogonna et al., 2016) reported a positive long-run relationship between public debt and unemployment using an ARDL approach, suggesting that increased borrowing may not necessarily lead to improved labour market outcomes. These conflicting findings highlight the need for further empirical investigation using robust time-series techniques.

With respect to financial inclusion, a growing body of literature suggests that improved access to financial services is associated with enhanced economic performance and labour market participation. For instance, (Demirguc-Kunt et al., 2017) constructed a multidimensional financial inclusion index and found that higher levels of financial inclusion are associated with lower unemployment rates across developing countries. Similarly, (Cull et al., 2014) and (World Bank, 2024) emphasise that access to finance supports business development, innovation, and employment generation. Additional studies (Zulfiqar et al., 2016) argue that financial inclusion enhances economic empowerment and facilitates income-generating activities, thereby contributing to improved welfare outcomes.

However, it is important to recognise that financial inclusion does not operate in isolation. Its effectiveness in influencing labour market outcomes may depend on complementary factors such as institutional quality, poverty conditions, and macroeconomic stability. Studies such as (Sykes et al., 2016) and (Mugo and Kilonzo, 2017) highlight that financial inclusion can improve income opportunities and reduce vulnerability, but its impact is mediated through broader economic structures. Empirical evidence from developing and African economies further supports the existence of a negative association between financial inclusion and unemployment (Mehry et al., 2020; Okoro et al., 2020; Eng et al., 2018; Sakanko et al., 2020). However, the magnitude and significance of this relationship vary across contexts.

Despite these contributions, the existing literature largely examines financial inclusion, poverty, and public debt independently, without adequately capturing their joint dynamics within a unified time-series framework. Given that these variables may exhibit non-stationary behaviour and long-run equilibrium relationships, an analytical approach that accounts for both long-run associations and short-run adjustment dynamics is required.

In line with this perspective, the present study formulates its hypotheses in terms of long-run relationships rather than direct causal effects:

- **H1:** Financial inclusion is negatively associated with unemployment in the long run.
- **H2:** Public debt is associated with unemployment in the long run.
- **H3:** Poverty is positively associated with unemployment in the long run.

These hypotheses are consistent with the study's econometric framework, which focuses on identifying equilibrium relationships and dynamic adjustments among the variables within a multivariate time-series system.

3. Research Methodology

3.1 Data and Variable Description

This study utilises annual time series data for Nigeria spanning the period 1990 to 2023, obtained from the World Bank's World Development Indicators database. The sample period is determined by data availability and consistency across all variables, yielding 34 observations suitable for time-series econometric analysis. Given the relatively small sample size, particular attention is paid to model specification and lag selection in subsequent analyses.

The variables included in the study are unemployment rate, financial inclusion, poverty rate, and public debt. In contrast to treating these variables as exogenous controls, the study models them as a jointly endogenous system within a multivariate time-series framework, consistent with the cointegration and VECM approach.

Financial inclusion is proxied by **domestic credit to the private sector (% of GDP)**, which captures the extent to which financial resources are intermediated to households and firms. This proxy is widely used in the literature as an indicator of financial access and depth, particularly in data-constrained environments where composite financial inclusion indices are unavailable (El-Bourainy and Salah, 2021). While this measure does not fully capture all dimensions of financial inclusion (such as access, usage, and quality), it provides a consistent and macroeconomically relevant indicator of financial intermediation.

Public debt is measured as total government debt expressed in billions of US dollars. The inclusion of public debt is motivated by its macroeconomic relevance in influencing aggregate demand, investment capacity, and fiscal sustainability, which may be associated with labour market outcomes (Matiti, 2013). While alternative fiscal variables such as public expenditure or investment could also be considered, public debt is selected to capture the financing dimension of government activity and its potential long-run association with unemployment.

The poverty rate is measured as the percentage of the population living below the international poverty line of $5.50 per day, reflecting the extent of income deprivation within the economy. The unemployment rate is measured as the percentage of the labour force that is without work but actively seeking employment.

Table 1
Variable Measurement and Data Sources

Variable Type	Variable Name	Symbol	Measurement / Proxy	Unit / Scale	Source
Dependent Variable	Unemployment Rate	Unemp	Percentage of the total labour force that is without work but actively seeking employment	Percentage (%)	World Bank (WDI)
Independent Variable	Financial Inclusion	IncFin	Domestic credit to private sector (proxy for financial access and intermediation)	% of GDP	World Bank (WDI)
Independent Variable	Poverty Rate	POVR	Population living below the international poverty line of $5.50 per day	Percentage (%)	World Bank (WDI)
Independent Variable	Public Debt	PUD	Total government debt	Billions of US Dollars (USD)	World Bank (WDI)

A detailed description of the variables, including their definitions, measurement proxies, units, and data sources, is presented in Table 1. The selection of variables is guided by both theoretical considerations and data availability, ensuring consistency within the multivariate time-series framework. In particular, financial inclusion is proxied by domestic credit to the private sector as a macro-level indicator of financial intermediation, while public debt captures the fiscal dimension of government borrowing. The poverty rate reflects income deprivation, and the unemployment rate represents labour market conditions. All variables are obtained from the World Bank's World Development Indicators (WDI), ensuring comparability and reliability of the data across the study period.

3.2 Econometric Methodology

This study adopts a multivariate time-series econometric framework to examine the long-run relationships and short-run adjustment dynamics among financial inclusion, unemployment, poverty, and public debt in Nigeria. Given the potential non-stationarity of macroeconomic time series, the analysis proceeds sequentially through unit root testing, cointegration analysis, long-run estimation using FMOLS, and short-run dynamics using the Vector Error Correction Model (VECM).

It is important to emphasise that the study does not seek to establish causal relationships

but rather to identify long-run equilibrium associations and dynamic adjustments among the variables within a system of jointly endogenous interactions.

Descriptive statistics are first computed to summarise the data properties. Diagnostic tests, including normality, autocorrelation, and heteroscedasticity tests, are conducted to assess model adequacy. All estimations are performed using EViews and STATA software.

Unit Root Test

To determine the stationarity properties of the variables, the Augmented Dickey–Fuller (ADF) unit root test is employed. The test examines the null hypothesis of a unit root (non-stationarity) against the alternative of stationarity. Establishing the order of integration is a prerequisite for cointegration analysis, as spurious regression results may arise when non-stationary series are analysed without appropriate transformations (Kissel and Poserina, 2017).

Baseline OLS Specification (Descriptive Benchmark)

Ordinary Least Squares (OLS) is initially employed as a baseline descriptive specification to provide preliminary insights into the linear association among the variables. However, given that the variables are integrated of order one, OLS estimates are not used for inference regarding long-run relationships, as such regressions may be subject to spurious correlation and endogeneity bias.

The baseline functional relationship is specified as:

$$Unemp_t = f(IncFin_t, POVR_t, PUD_t)$$

The corresponding linear specification is given by:

$$Unemp_t = \beta_0 + \beta_1 IncFin_t + \beta_2 POVR_t + \beta_3 PUD_t + \varepsilon_t$$

Following standard practice in time-series modelling, a logarithmic transformation of the unemployment rate is applied to stabilize variance and improve interpretability in proportional terms (Kissel and Poserina, 2017). Accordingly, the empirical specification becomes:

$$\ln Unemp_t = \beta_0 + \beta_1 IncFin_t + \beta_2 POVR_t + \beta_3 PUD_t + \varepsilon_t$$

The log transformation is not intended to imply elasticity interpretation in a strict causal sense but rather to improve model fit and reduce heteroscedasticity. Given the limitations of OLS with non-stationary data, the results from this specification are interpreted cautiously and serve only as a preliminary benchmark.

Fully Modified Ordinary Least Squares (FMOLS)

To obtain consistent estimates of the long-run relationships among the variables, the study employs the Fully Modified Ordinary Least Squares (FMOLS) estimator. FMOLS corrects for both serial correlation and potential endogeneity arising from the cointegrating relationship among

non-stationary variables, thereby providing reliable long-run parameter estimates (Kissel and Poserina, 2017).

The FMOLS estimator modifies the conventional OLS estimator as follows:

$$\hat{\beta} = (X'X)^{-1}X'(Y + \Delta)$$

where Δ represents the correction term accounting for endogeneity and serial correlation. By incorporating leads and lags of the differenced regressors, FMOLS ensures asymptotically unbiased and efficient estimation of the long-run equilibrium relationship.

Cointegration Analysis and Vector Error Correction Model (VECM)

The Johansen cointegration technique is employed to test for the existence of long-run equilibrium relationships among the variables. The test is based on a Vector Autoregressive (VAR) framework and utilizes both trace and maximum eigenvalue statistics to determine the number of cointegrating equations (Iwuoha, 2020).

The VAR model is specified as:

$$Y_t = \phi + \Phi_1 Y_{t-1} + \cdots + \Phi_p Y_{t-p} + \varepsilon_t$$

where Y_t is a vector comprising $\ln Unemp_t$, $IncFin_t$, $POVR_t$, and PUD_t.

When cointegration is established, the VAR model is reparameterized into a Vector Error Correction Model (VECM), which captures both long-run equilibrium and short-run adjustment dynamics:

$$\Delta Y_t = \phi + \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Phi_j \Delta Y_{t-j} + \varepsilon_t$$

where Π represents the error correction term, reflecting the speed at which deviations from long-run equilibrium are corrected.

The VECM system allows each variable to be treated as endogenous, thereby addressing potential endogeneity concerns within the system. The inclusion of lagged differences captures short-run dynamics, while the error correction term provides evidence of long-run adjustment.

Given the limited sample size ($T = 34$), lag selection is carefully considered to avoid overparameterization. The implications of lag length choices are explicitly acknowledged in the interpretation of results.

4. Results

Table 2
Descriptive Statistics

Variables	N	Mean	Standard Deviation	Probability (Jarque–Bera)	Value Unit
Unemployment	34	4.971	1.972	0.5139	%
Financial Inclusion	34	10.436	3.493	0.4523	% of GDP
Poverty Rate	34	91.652	1.214	0.5698	%
Public Debt	34	38.267	22.752	0.9470	Billion USD

Table 2 presents the descriptive statistics of the variables over the study period. The average unemployment rate is approximately 4.97 %, with a standard deviation of 1.97 %, indicating moderate variation in labour market conditions over time. Financial inclusion, proxied by domestic credit to the private sector, records a mean value of 10.44 % of GDP with a standard deviation of 3.49 %, suggesting noticeable fluctuations in financial intermediation across the period. The poverty rate exhibits a high average of 91.65 %, with relatively low variability (standard deviation of 1.21 %), reflecting persistently elevated poverty levels in Nigeria. Public debt shows a mean value of 38.27 billion US dollars and a relatively large standard deviation of 22.75 billion US dollars, indicating substantial variation in government borrowing over time.

The Jarque–Bera probability values for all variables exceed the conventional 0.05 threshold, suggesting that the null hypothesis of normal distribution cannot be rejected. This indicates that the series does not exhibit significant departures from normality, thereby supporting the suitability of the data for subsequent econometric analysis. However, it is important to note that normality does not imply data reliability but rather provides supporting evidence for the appropriateness of statistical inference under standard assumptions.

Table 3
Unit Root Test Results (Augmented Dickey–Fuller Test)

Variables	Test Statistic	P-value	Order of Integration
$\ln Unemployment$	-3.93	0.0060	I(1)
Financial Inclusion	-5.31	0.0001	I(1)
Poverty Rate	-7.24	0.0000	I(1)
Public Debt	-3.17	0.0315	I(1)

Table 3 reports the results of the Augmented Dickey–Fuller (ADF) unit root test for all variables. The findings indicate that the series are non-stationary at levels but become stationary after first differencing, implying that all variables are integrated of order one, I(1). The reported test statistics at first difference are sufficiently negative, with corresponding p-values below the conventional 0.05 significance level, leading to the rejection of the null hypothesis of a unit root.

The presence of I(1) variables justifies the application of cointegration techniques to examine the existence of long-run equilibrium relationships among the variables. This is particularly important in time-series analysis, as estimating relationships among non-stationary variables in levels without accounting for cointegration may result in spurious regression outcomes (Kissel and Poserina, 2017). Consequently, the integration properties of the variables provide the necessary foundation for the subsequent Johansen cointegration test and the estimation of long-run and short-run dynamics using FMOLS and VECM.

Table 4
Baseline OLS Regression Results

$\ln Unemployment$	**Coefficient**	**t-Statistic**	**P-value**	**VIF**
Financial Inclusion	-0.0075	-2.63	0.034	1.41
Poverty Rate	0.0781	2.08	0.046	1.68
Public Debt	-0.0088	-5.14	0.000	1.23
Constant	8.2861	2.34	0.026	—

Overall Model P-value = 0.0000
Root MSE = 0.2023
R-squared = 0.6518
Adj. R-squared = 0.6170

Diagnostic Tests:

- Jarque–Bera (Normality): p-value = 0.6704
- Durbin–Watson = 1.8954
- Heteroscedasticity test: p-value = 0.1443

Table 4 presents the results of the baseline Ordinary Least Squares (OLS) regression, estimated primarily as a descriptive benchmark of the linear association among the variables. The overall model is statistically significant, and the R-squared value indicates that approximately 65.18 % of the variation in the unemployment rate is associated with variations in financial inclusion, poverty rate, and public debt. The variance inflation factor (VIF) values for all regressors are below conventional thresholds, suggesting the absence of multicollinearity. In addition, the diagnostic tests indicate no evidence of heteroscedasticity or serial correlation, while the residuals appear normally distributed.

However, given that the variables are integrated of order one, I(1), the OLS estimates should be interpreted with caution, as regressions involving non-stationary series may produce spurious results if long-run relationships are not explicitly accounted for. Consequently, the coefficients obtained from the OLS model are not interpreted as evidence of causal effects or used to formally test the study hypotheses.

Notwithstanding these limitations, the signs of the estimated coefficients provide preliminary insights into the direction of association among the variables. Financial inclusion and public debt exhibit negative coefficients, while the poverty rate shows a positive coefficient in relation to unemployment. These patterns are broadly consistent with theoretical expectations discussed in the literature, including the financial literacy theory of financial inclusion (Ozili, 2020), the Keynesian perspective on public debt (Jefferson, 2012), and the liberal theory of poverty and unemployment (Jefferson, 2012). However, a more reliable assessment of long-run relationships is provided by the cointegration and FMOLS results, which explicitly account for the non-stationary properties of the data.

Table 5
FMOLS Long-Run Estimation Results

$\ln Unemployment$	**Coefficient**	**t-Statistic**	**P-value**
Financial Inclusion	-0.076	-2.39	0.0002
Poverty Rate	0.089	1.79	0.0031
Public Debt	-0.008	-3.52	0.0014
Constant	9.333	2.00	0.0546

R-squared = 0.642
Adj. R-squared = 0.605

Diagnostic Test:

- Jarque–Bera (Normality): p-value = 0.6623

Table 5 presents the Fully Modified Ordinary Least Squares (FMOLS) estimates, which provide consistent and efficient estimates of the long-run relationships among the variables in the presence of cointegration. The results indicate that financial inclusion and public debt are negatively associated with unemployment in the long run, while the poverty rate exhibits a positive long-run association with unemployment.

Specifically, the coefficient of financial inclusion is negative and statistically significant, suggesting that higher levels of financial intermediation are associated with lower unemployment over the long run. Similarly, public debt displays a negative and statistically significant coefficient, indicating that increases in public debt are associated with lower unemployment within the long-run equilibrium framework. In contrast, the poverty rate is positively associated with

unemployment, implying that higher levels of poverty are linked with higher unemployment over time.

These findings are consistent with the theoretical expectations outlined in the financial literacy theory of financial inclusion (Ozili, 2020), the Keynesian perspective on public debt (Jefferson, 2012), and the liberal theory of poverty and unemployment (Jefferson, 2012), although the relationships should be interpreted as long-run associations rather than direct causal effects. The results therefore provide support for the formulated hypotheses (H1–H3), which are expressed in terms of long-run relationships.

The R-squared value of 0.642 indicates that approximately 64.2 % of the variation in unemployment is explained by the long-run relationship with financial inclusion, poverty, and public debt. The Jarque–Bera test statistic suggests that the residuals are normally distributed, supporting the adequacy of the model specification.

Table 6

Johansen Cointegration Test and VECM Results

Johansen Cointegration Test

Statistic	**Value**
Trace Statistic ($r = 0$)	49.48
Critical Value (5 %)	47.21

Vector Error Correction Model (VECM)

Equation	**Lag Length**	**R-squared**	**P-value**
$\Delta \ln Unemployment$	6	0.5780	0.0059
$\Delta Financial\ Inclusion$	6	0.7019	0.0016
$\Delta Poverty\ Rate$	6	0.6441	0.0258
$\Delta Public\ Debt$	6	0.8481	0.0000

Diagnostic Tests:

- Jarque–Bera (Normality): p-value = 0.0582
- Autocorrelation Test: p-value = 0.9430

According to Table 6, the Johansen cointegration test results indicate the existence of at least one cointegrating relationship among the variables, as the trace statistic (49.48) exceeds the corresponding 5 % critical value (47.21). This provides empirical evidence of a stable long-run equilibrium relationship among unemployment, financial inclusion, poverty, and public debt, thereby justifying the use of a Vector Error Correction Model (VECM) to capture both long-run

and short-run dynamics.

The VECM estimates reveal statistically significant short-run dynamics across the system of equations, as indicated by the reported p-values. The specification incorporates lagged differences of the variables alongside the error correction mechanism, allowing for the adjustment of short-run deviations toward the long-run equilibrium. The significance of the model suggests that short-run fluctuations in the variables are systematically related to past disequilibria and changes in the explanatory variables.

The diagnostic tests indicate that the residuals are approximately normally distributed and free from serial correlation, supporting the adequacy of the model specification. However, it is important to note that the model employs six lag lengths within a relatively small sample size (T = 34), which may introduce concerns regarding over-parameterisation and degrees of freedom. While the lag structure was selected based on standard lag selection criteria, this limitation is acknowledged and should be considered when interpreting the magnitude and stability of the short-run coefficients. Overall, the VECM results complement the FMOLS findings by confirming the presence of long-run equilibrium relationships and providing evidence of short-run adjustment dynamics among financial inclusion, unemployment, poverty, and public debt within a multivariate time-series framework.

Figure 1. CUSUM Test for the Stability of the OLS Regression

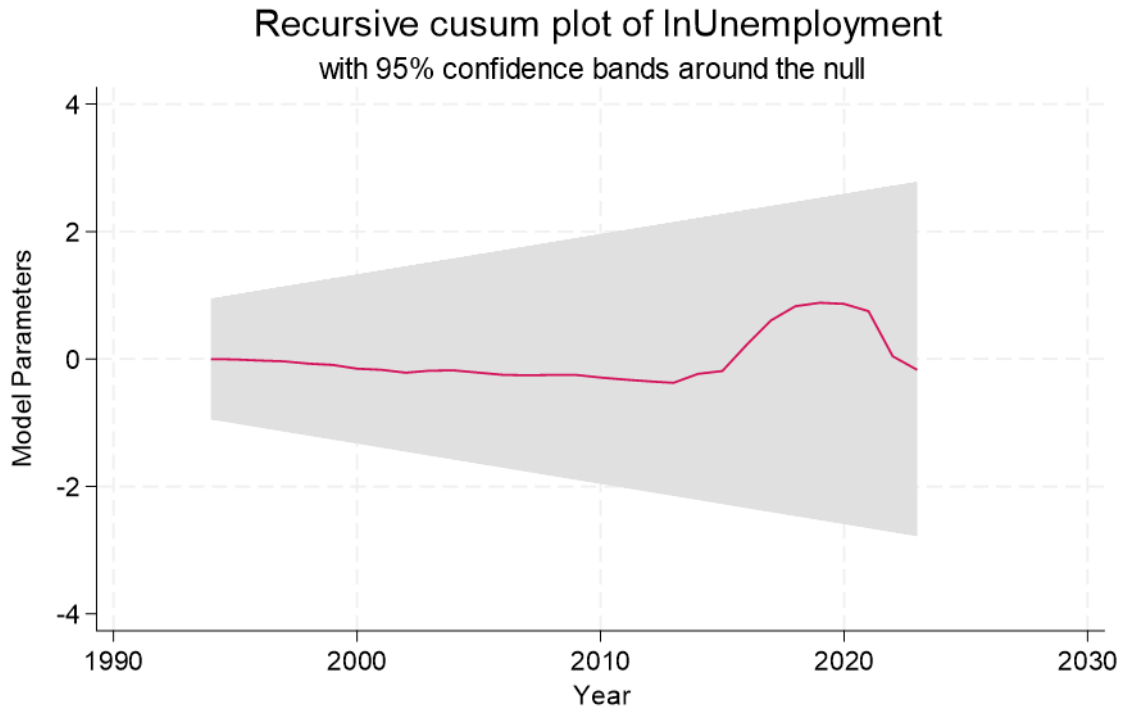

Figure 2. Graph of the variable series versus the year under review

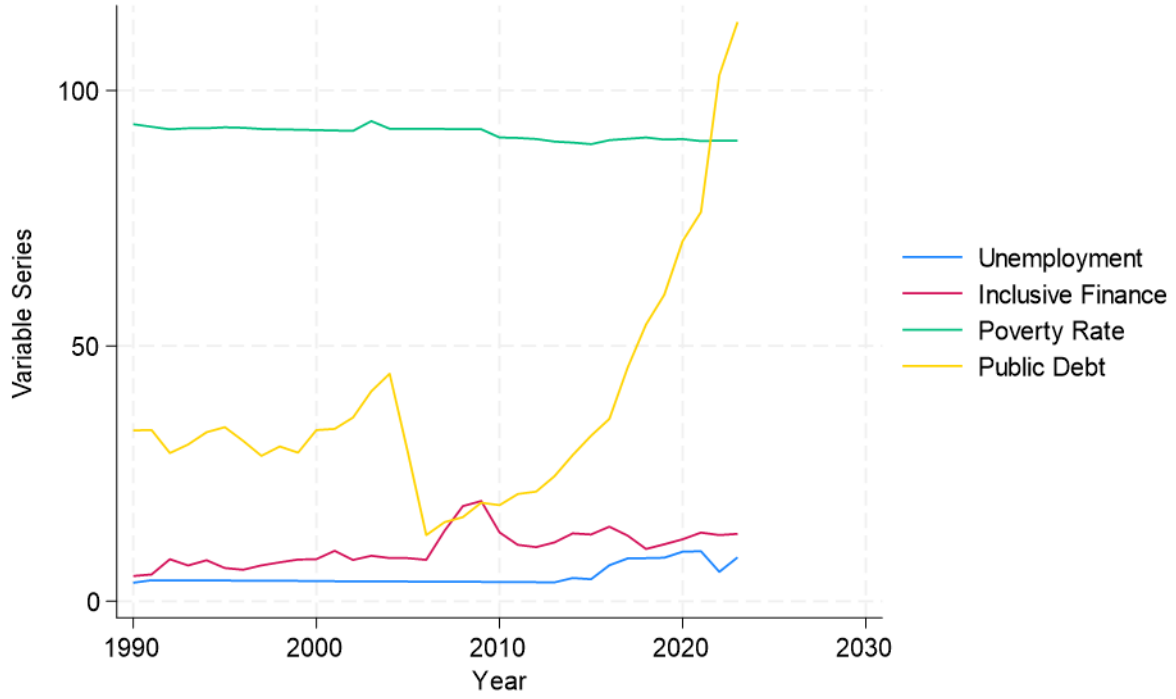

Figure 2 presents the recursive CUSUM test for parameter stability of the estimated model. The plot shows that the cumulative sum of recursive residuals remains within the 95 % confidence bands throughout the sample period. This indicates that the estimated coefficients are stable over time and that there is no evidence of significant structural instability in the model. Consequently, the stability condition required for reliable inference in the regression framework is satisfied.

Figure **??** illustrates the time-series evolution of unemployment, financial inclusion, poverty rate, and public debt in Nigeria over the study period. The graphical representation highlights distinct trends and fluctuations across the variables. Public debt exhibits a pronounced upward trajectory, particularly in the later years, indicating increased government borrowing over time. Financial inclusion shows moderate variation with a general upward movement, while the unemployment rate displays periods of gradual increase, especially in recent years. In contrast, the poverty rate remains persistently high with relatively limited variation.

It is important to emphasise that the graphical comparison of variable levels does not provide evidence of relative importance or causal influence among the variables. Instead, the figures serve a descriptive purpose by illustrating the co-movement and temporal patterns of the series.

4.1 Discussion

Unemployment remains a persistent macroeconomic challenge in developing economies, particularly in Nigeria, where structural constraints, fiscal imbalances, and social vulnerabilities interact to shape labour market outcomes. The present study contributes to this discourse by examining the interconnected dynamics among financial inclusion, public debt, poverty, and

unemployment within a unified time-series framework that captures both long-run equilibrium relationships and short-run adjustment processes.

The empirical findings from the FMOLS estimation provide evidence of statistically significant long-run associations among the variables. Specifically, financial inclusion is negatively associated with unemployment in the long run, suggesting that improvements in financial intermediation and access to credit are linked with more favourable labour market outcomes over time. This finding is consistent with the financial literacy theory of financial inclusion (Ozili, 2020), which emphasises the role of financial access in enhancing economic participation through indirect channels such as entrepreneurial financing, small business development, and investment expansion. Empirically, this result aligns with studies such as (Mehry et al., 2020), (Okoro et al., 2020), and (Sun and Scola, 2023), which report a negative association between financial inclusion and unemployment across developing and African economies. Contrary to the earlier interpretation, the findings of (El-Bourainy and Salah, 2021) also indicate that financial inclusion is associated with lower unemployment levels in developing countries, thereby reinforcing the consistency of the present study with the broader empirical literature.

The results further reveal a negative long-run association between public debt and unemployment. This outcome is broadly consistent with the Keynesian perspective, which posits that government borrowing can stimulate aggregate demand and economic activity when effectively allocated toward productive investments (Jefferson, 2012). The finding is in line with (Iwuoha, 2020), who reported an inverse relationship between public debt and unemployment in Nigeria using a VECM framework.

However, contrasting evidence from (Ogonna et al., 2016) suggests that the effectiveness of public debt in improving labour market outcomes depends on the structure and utilisation of borrowed funds. This divergence highlights the importance of fiscal quality, suggesting that the observed negative association should be interpreted within the context of long-run macroeconomic conditions rather than as a direct policy prescription.

In contrast, the poverty rate exhibits a positive and statistically significant long-run association with unemployment, indicating that higher levels of poverty are linked with weaker labour market performance over time. This finding supports the liberal theory of poverty and unemployment (Jefferson, 2012), which emphasises structural constraints and market inefficiencies as drivers of both poverty and unemployment. Empirical evidence from (Ariski et al., 2022), (Mg et al., 2019), and (Murjani, 2018) similarly documents a positive relationship between poverty and unemployment, although opposing findings such as (Ani, 2019) suggest that this relationship may vary depending on country-specific conditions and methodological approaches. The persistence of high poverty levels observed in the descriptive analysis further reinforces the structural nature of this relationship in the Nigerian context.

The Johansen cointegration results confirm the existence of a stable long-run equilibrium relationship among the variables, indicating that financial inclusion, public debt, poverty, and unemployment move together over time. The VECM estimates complement this finding by providing evidence of short-run adjustment dynamics, suggesting that deviations from the long-run equilibrium are gradually corrected. This reinforces the interpretation that the relationships identified

in the study are not static but evolve through dynamic interactions within the macroeconomic system.

It is important to emphasise that the OLS results are interpreted only as a descriptive benchmark and not as evidence of causal effects, given the non-stationary nature of the variables. Similarly, the graphical analysis of the variable series provides descriptive insights into temporal trends but does not establish the relative importance or causal influence of the variables. Instead, the combined evidence from FMOLS, cointegration, and VECM offers a more robust basis for understanding the long-run associations and short-run dynamics among the variables.

Overall, the study provides a more coherent understanding of how financial inclusion, fiscal conditions, and poverty interact within a dynamic macroeconomic framework to shape unemployment outcomes in Nigeria. By integrating these variables within a unified time-series system, the findings highlight the importance of coordinated policy approaches that consider the interdependence of financial, fiscal, and social factors in addressing labour market challenges.

5. Conclusion

This study examined the long-run relationships and short-run adjustment dynamics among financial inclusion, unemployment, poverty, and public debt in Nigeria within a multivariate time-series framework. By integrating cointegration analysis, FMOLS, and VECM, the study provides evidence of a stable long-run equilibrium relationship among the variables, indicating that financial inclusion, fiscal conditions, and poverty are systematically associated with labour market outcomes over time.

The empirical findings reveal that financial inclusion is negatively associated with unemployment in the long run, suggesting that improvements in financial intermediation and access to credit are linked with more favourable labour market conditions. Public debt also exhibits a negative long-run association with unemployment, although this relationship should be interpreted cautiously, as the effectiveness of public borrowing depends on the allocation and productivity of the financed expenditures. In contrast, the poverty rate is positively associated with unemployment, highlighting the persistent structural linkage between income deprivation and labour market challenges.

The results further demonstrate the presence of short-run adjustment dynamics, indicating that deviations from long-run equilibrium are gradually corrected within the system. This reinforces the importance of viewing unemployment dynamics within a broader macroeconomic context where financial, fiscal, and social factors interact over time rather than in isolation.

From a policy perspective, the findings suggest that improving financial inclusion may be associated with better labour market outcomes when supported by complementary structural conditions. However, the observed relationship between public debt and unemployment does not imply that increasing debt levels will necessarily reduce unemployment; rather, it underscores the importance of efficient and productive utilisation of borrowed funds. Similarly, addressing persistently high poverty levels remains critical, as poverty continues to be strongly associated with adverse labour market conditions.

Notwithstanding these contributions, the study is subject to certain limitations. The relatively small sample size may constrain the degrees of freedom in the estimation, particularly in the VECM specification with multiple lags. In addition, the proxy used for financial inclusion captures the depth of financial intermediation and may not fully reflect other dimensions such as access, usage, and quality of financial services. Future research could extend this analysis by incorporating broader financial inclusion indices, alternative fiscal indicators, or higher-frequency data to provide deeper insights into the dynamic interactions among these variables.

Overall, the study contributes to the literature by providing a unified empirical framework that captures both long-run equilibrium relationships and short-run dynamics among key macroeconomic variables in Nigeria, offering a more coherent basis for understanding the interplay between financial inclusion, fiscal policy, poverty, and unemployment.

References

Ani, M. (2019). The effect of education and unemployment on poverty in east java province, 2011–2016.

Ariski, F., Usman, U., and Abbas, T. (2022). The analysis of termination of employment. 5(April):9–16.

Chen, Y., Xia, Q., and Wang, X. (2021). Consumption and income poverty in rural china. 29(4):1995–2018.

Cloete, A. (2002). Youth unemployment in south africa: A theological reflection through the lens of human dignity. pages 513–525.

Cull, R., Ehrbeck, T., and Holle, N. (2014). Financial inclusion and development: Recent impact evidence. Technical Report 92, CGAP Focus Note, United States.

Dahliah, D. and Nur, A. (2021). The influence of unemployment, human development index and gross domestic product on poverty level. 1(2):95–108.

Debt Management Office (2024). Nigeria debt profile.

Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., and Hess, J. (2017). *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. World Bank Group, United States.

El-Bourainy, M. and Salah, A. (2021). The impact of financial inclusion on unemployment rate in developing countries. *International Journal of Economics and Financial Issues*, 11(1):79–93.

Eng, K., Law, C., and Loke, Y. (2018). The impact of financial access on gender unemployment: Panel data evidence from 51 developed and developing countries. *Borneo Journal of Social Sciences & Humanities*.

Iwuoha, J. (2020). Rising unemployment in nigeria: Public debt to the rescue? *Current Research Journal of Social Sciences*, 3(2):280–290.

Jefferson, P. (2012). *The Oxford Handbook of the Economics of Poverty*. Oxford University Press, London.

Kissel, R. and Poserina, J. (2017). Development of log-linear regression model.

Matiti, C. (2013). The relationship between public debt and economic growth in kenya. *International Journal of Social Science and Project Planning Management*, 1(1):1–12.

Mehry, E., Ashraf, S., and Marwa, E. (2020). The impact of financial inclusion on unemployment rate in developing countries. *International Journal of Economics and Financial Issues*, 11(1):79.

Mg, N., Permata, P., and Aryo, B. (2019). The impact of zakat, infaq, shodaqoh (ZIS), unemployment and poverty on the economic growth in indonesia (2011–2017). In *Proceedings of the 2018 International Conference on Islamic Economics and Business (ICONIES 2018)*, volume 101, pages 210–214.

Mugo, M. and Kilonzo, E. (2017). Community-level impacts of financial inclusion in kenya with particular focus on poverty eradication and employment creation. Technical report, Central Bank of Kenya, Kenya.

Murjani, A. (2018). Short-run and long-run impact of inflation, unemployment, and economic growth towards poverty in indonesia: ARDL approach. 2(1).

Ogonna, I., Idenyi, O., Ifeyinwa, A., and Gabriel, N. (2016). The implications of rising public debt on unemployment in nigeria: An auto regressive distributed lag approach. *Asian Research Journal of Arts & Social Sciences*, 1(1):1–15.

Okoro, C., Obiekwe, C., and Okoro, O. (2020). Impact of financial inclusion on unemployment in sub-saharan economies: A study of nigeria and ghana. *IIARD International Journal of Banking and Finance Research*, 6(2):20–30.

Ozili, P. (2020). Theories of financial inclusion. In *Theories of Financial Inclusion*, pages 89–115. Emerald Publishing Limited.

Ozili, P. (2024). Impact of financial inclusion, financial stability, bank nonperforming loans, inflation, macroeconomic management quality and unemployment on economic growth in nigeria. *African Journal of Economic and Management Studies*.

Probosiwi, R. (2016). Unemployment and its influence on poverty level. 1:89–100.

Rani, U., Dhir, R., Furrer, M., Göbel, N., Moraiti, A., and Cooney, S. (2021). *World Employment and Social Outlook: The Role of Digital Labour Platforms in Transforming the World of Work*. International Labour Organisation.

Sakanko, M., David, J., and Onimisi, A. (2020). Advancing inclusive growth in nigeria: The role of financial inclusion in poverty, inequality, household expenditure, and unemployment. *Indonesian Journal of Islamic Economics Research*, 2(2):70–84.

Sun, Y. and Scola, N. (2023). Examining the impact of financial inclusion on unemployment in africa (A panel data analysis). *AIRSP*, 5(51):23–50.

Sykes, J., Elder, S., Gurbuzer, Y., and Principi, M. (2016). Exploring the linkages between youth financial inclusion and job creation: Evidence from the ILO school-to-work transition surveys. Technical report, International Labour Organization.

United Nations (2024). Global unemployment to increase in 2024, warns ILO report.

Wibowo, D., Mardani, Y., and Iqbal, M. (2023). Impact of financial inclusion on economic growth and unemployment. *International Journal of Finance & Banking Studies*, 12(2):55–66.

World Bank (2024). Unemployment rate, percent of total labor force.

Zulfiqar, K., Chaudhary, M., and Aslam, A. (2016). Financial inclusion and its implications for inclusive growth in pakistan. *Pakistan Economic and Social Review*, 54(2):297–325.