

# Monetary Policy and Development of Nigerian Economy

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*Abstract- This study examined monetary policy and development of the Nigerian economy over the period 2001–2025. The study was motivated by the need to determine how major monetary policy instruments influence human development outcomes in Nigeria. An ex-post facto research design was adopted, using annual secondary data on Human Development Index (HDI), Monetary Policy Rate (MPR), Treasury Bill Volume (TBVOL), Money Supply (M2), and Cash Reserve Ratio (CRR). Data were obtained from Central Bank of Nigeria publications, the National Bureau of Statistics, and other sources. Ordinary Least Squares regression was employed using EViews 9.0. Descriptive statistics, correlation analysis, Variance Inflation Factor, diagnostic tests, Group Unit Root Test, and Johansen Cointegration Test were also conducted. The regression results showed that the monetary policy variables jointly had a statistically significant effect on HDI, with an R-squared value of 0.998254 and an F-statistic probability value of 0.0000. MPR had a positive and statistically significant effect on HDI, with a coefficient of 0.033857 and probability value of 0.0000. TBVOL exerted a negative and statistically significant effect, with a coefficient of -0.052537 and probability value of 0.0363. M2 had a negative but statistically insignificant effect, with a coefficient of -0.035621 and probability value of 0.0905. CRR had a negative and statistically significant effect on HDI, with a coefficient of -0.078482 and probability value of 0.0000. The findings indicate that monetary policy instruments influence economic development through different transmission channels, including interest rates, liquidity, credit availability, and financial intermediation. The study concludes that monetary policy should be carefully designed to support macroeconomic stability while promoting productive investment, credit access, employment, and improvements in human welfare. The study recommends balanced MPR management, improved Treasury bill operations, productive allocation of monetary expansion, and carefully calibrated CRR policies to strengthen monetary policy transmission, support productive activities, and foster sustainable economic development in Nigeria. The study contributes to Nigerian literature by demonstrating that monetary instruments can produce different outcomes, underscoring coordinated policy implementation and effective transmission mechanisms.*

**Keywords:** Monetary Policy, Economic Development, Human Development Index, Monetary Policy Rate, Treasury Bill Volume, Money Supply, Cash Reserve Ratio, Nigeria.

## I. INTRODUCTION

Monetary policy remains an important instrument for influencing macroeconomic stability and economic development, particularly in developing economies such as Nigeria. The Central Bank of Nigeria (CBN) employs instruments including the monetary policy rate (MPR), Treasury bill volume (TBVOL), broad money supply (M2), and cash reserve ratio (CRR) to regulate liquidity, influence credit conditions, and stimulate economic activity. Through these channels, monetary policy is expected to support investment, employment, productivity, and improvements in living standards. However, Nigeria continues to experience poverty, unemployment, inequality, and inadequate human capital development despite frequent monetary policy adjustments. Adeleke and Ogunrinola (2023) observed that monetary interventions have not consistently produced substantial improvements in welfare outcomes, while Eze and Ogbonna (2024) attributed weak developmental outcomes partly to persistent structural constraints within the economy.

The effectiveness of monetary policy depends largely on the strength of its transmission mechanism. The MPR serves as a benchmark for interest rates and is expected to influence the cost of borrowing for households and businesses, thereby affecting investment and consumption. Similarly, changes in the CRR influence the amount of funds available to banks for lending to the productive sectors of the economy. However, Olowookere and Adebayo (2022) found that structural rigidities and imperfections within Nigeria's financial system can weaken the transmission of CRR adjustments to the real sector. Yusuf et al. (2023) further noted that high risk premiums and lending

costs may reduce the effectiveness of monetary policy rate adjustments. Consequently, reductions in policy rates or reserve requirements may not necessarily generate proportional increases in productive investment or improvements in human development. TBVOL and M2 also constitute important channels through which monetary policy affects economic activity. Treasury bills are used to manage short-term liquidity and influence interest-rate conditions, while changes in money supply affect the availability of funds for consumption and investment. Although increased liquidity can support economic activity, its developmental effect depends on how effectively funds are channelled into productive sectors. Ibrahim and Lawal (2024) noted that liquidity within Nigeria's financial system does not always reach sectors such as agriculture and manufacturing. Similarly, Onyema and Uche (2023) argued that excessive monetary expansion can generate inflationary pressures, thereby reducing purchasing power and undermining improvements in living standards. These concerns are important because the human development index (HDI), which incorporates income, education, and life expectancy, provides a broader measure of development than conventional economic output indicators. Ajayi and Oloruntoba (2024) therefore emphasized the need to examine whether monetary policy interventions translate into measurable improvements in human development.

Despite the continuous use of monetary policy instruments by the CBN, Nigeria continues to record challenges in human development, raising questions about the effectiveness of monetary policy in promoting broader welfare. Weak transmission mechanisms, high lending costs, financial market imperfections, and structural constraints may prevent monetary policy from producing the desired effects on investment, employment, income, education, and health. Ojo (2022) reported that monetary policy adjustments have frequently generated limited effects in the real sector, while Abubakar and Danladi (2023) associated weak policy outcomes with inconsistencies in implementation and persistent macroeconomic instability. These challenges create uncertainty regarding the extent to which MPR, TBVOL, M2, and CRR jointly explain variations in HDI in Nigeria.

Furthermore, existing empirical evidence presents inconsistent findings regarding the relationship between monetary policy and development outcomes. Some studies report positive effects of monetary variables, while others identify negative or statistically insignificant relationships. These inconsistencies may partly result from differences in variables, periods, methodologies, and measures of development adopted by previous researchers. More importantly, existing studies have often examined individual monetary policy instruments separately rather than considering their collective influence on human development. This creates an empirical gap because the interaction of several monetary policy instruments may provide a more comprehensive explanation of changes in HDI. Therefore, this study investigates the joint effect of MPR, TBVOL, M2, and CRR on HDI in Nigeria, using an Ordinary Least Squares (OLS) framework to provide evidence on their combined relationship with human development.

## II. LITERATURE REVIEW

### Conceptual Review

#### Monetary Policies

Monetary policies refer to deliberate actions taken by monetary authorities to regulate money supply, liquidity, interest rates, and credit conditions in order to achieve macroeconomic objectives such as price stability, economic growth, employment, and financial stability. In Nigeria, the CBN uses instruments such as the MPR, open market operations, M2, and CRR to influence economic activity. The MPR serves as a benchmark for lending and borrowing rates, while open market operations regulate liquidity through the purchase and sale of government securities. However, the effectiveness of these instruments may be weakened by financial market inefficiencies, high lending spreads, and risk aversion within the banking sector (Central Bank of Nigeria, 2022; Adamu & Sanni, 2023). Similarly, changes in money supply can stimulate consumption and investment when aligned with productive capacity, but excessive monetary expansion may generate inflation and reduce real purchasing power (Udeh, 2022).

The CRR is another important monetary policy instrument because it determines the proportion of

commercial banks' deposits that must be maintained as reserves with the CBN. A high CRR can reduce banks' loanable funds and constrain credit availability, particularly for businesses and small and medium-sized enterprises, while a lower ratio can increase liquidity and support lending. Ogunleye and Adegbite (2023) argue that restrictive monetary conditions can reduce private-sector investment and limit productive activities. Although monetary policy is essential for maintaining economic stability, its impact on development depends on the strength of financial intermediation and broader economic conditions. Structural constraints, weak institutions, inadequate infrastructure, and limited access to finance can reduce the transmission of monetary policy to productive sectors. Consequently, sustainable development requires monetary policy to operate alongside complementary fiscal, institutional, and financial-sector reforms (IMF, 2023).

Economic Development in Nigeria, measured with Human Development Index (HDI)

Economic development refers to sustained improvements in people's welfare and quality of life through progress in income, education, health, and living standards. In Nigeria, the Human Development Index (HDI) provides a broader measure of development than conventional output indicators such as Gross Domestic Product because it combines dimensions of health, education, and standard of living. Oyinola and Adedeji (2022) noted that HDI provides a more comprehensive assessment of development by incorporating social and economic indicators of well-being. Despite periods of economic growth, particularly from oil-related activities, Nigeria continues to experience challenges in translating economic expansion into broad-based improvements in human welfare. Afolabi and Eze (2023) observed that economic growth has not consistently produced corresponding improvements in human development, while Adeyemi and Nwosu (2024) identified income inequality, inadequate healthcare infrastructure, and limited access to quality education as major constraints to improved HDI outcomes.

Human development in Nigeria is also influenced by macroeconomic stability, public investment, institutional quality, and financial inclusion. Inflation

and exchange-rate instability can reduce purchasing power and restrict access to essential goods and services, thereby weakening improvements in living standards (Ogunleye & Olagunju, 2023). Similarly, inadequate and inefficient investment in education and healthcare can limit human capital development and constrain long-term welfare outcomes. Access to financial services and credit is equally important because it enables households and businesses to undertake productive activities, generate income, and improve living conditions. However, financial exclusion, particularly among low-income and rural populations, continues to restrict economic opportunities. Ezech and Okafor (2023) emphasized that limited access to financial services can reinforce poverty and hinder inclusive human development. Therefore, improving Nigeria's HDI requires an integrated approach involving macroeconomic stability, effective investment in social services, stronger institutions, and broader access to financial opportunities.

### III. THEORETICAL REVIEW

The theoretical review is anchored on Keynesian Theory of Money and Quantity Theory of Money, explaining how interest rates and money supply influence economic development and HDI.

#### Keynesian Theory of Money

The Keynesian Theory of Money, developed by John Maynard Keynes, emphasizes the role of interest rates, investment, and aggregate demand in determining economic activity. The theory explains that changes in monetary policy rates influence borrowing costs, investment, consumption, employment, and income. A reduction in interest rates can encourage borrowing and productive investment, potentially increasing output and improving welfare, while higher rates may discourage investment and reduce economic activity. In relation to Nigeria, the theory provides a framework for examining how the MPR affects economic development and human development outcomes. However, the effectiveness of this transmission mechanism may be constrained by high lending costs, weak financial intermediation, and structural inefficiencies. Recent evidence emphasizes the importance of effective monetary transmission in

translating policy actions into real-sector outcomes (Ogujiuba & Adeniyi, 2025).

#### Quantity Theory of Money

The Quantity Theory of Money, associated with Irving Fisher, explains the relationship between money supply, prices, and economic activity through the equation of exchange. The theory suggests that changes in money supply can influence the general price level, particularly when real output and the velocity of money remain relatively stable. In this study, M2 represents an important monetary policy variable because changes in liquidity can affect borrowing, investment, employment, and income, thereby influencing HDI outcomes. However, excessive monetary expansion beyond productive capacity may generate inflation, reduce purchasing power, and weaken living standards. This is particularly relevant to Nigeria, where inflationary pressures can undermine welfare improvements. Therefore, effective management of M2 requires balancing liquidity expansion with price stability and productive economic capacity (Adeyemi & Salami, 2025).

#### IV. EMPIRICAL REVIEW

Hassan and Bello (2025) examined the effect of the MPR on human development in Nigeria from 1990 to 2023 using the Autoregressive Distributed Lag (ARDL) model. Data were obtained from the Central Bank of Nigeria and UNDP. Findings showed that MPR had a negative and significant short-run effect on HDI but an insignificant long-run effect. The study recommended balanced monetary policies that support growth and price stability.

Olatunji and Kareem (2025) investigated the effect of prime lending rate (PLR) on economic development in Nigeria between 1990 and 2023, employing cointegration and Error Correction Model (ECM) techniques. Using secondary data from official financial statistics, the study found that high lending rates negatively affected welfare outcomes by increasing borrowing costs and restricting investment. The authors recommended measures to reduce lending costs and promote investment and improved living standards.

Salisu and Bamidele (2024) examined the role of financial inclusion in strengthening monetary policy effectiveness in Nigeria over 2004–2022. Using ARDL and cointegration techniques with national and international data, the study found that financial inclusion significantly enhanced monetary policy transmission to economic development and welfare indicators. The authors concluded that broader access to financial services, particularly among rural and underserved populations, is important for improving monetary policy effectiveness.

Diop and Fall (2024) investigated the relationship between money supply and human development in Senegal from 2000 to 2022 using panel regression techniques and secondary data from global development databases. The findings indicated that money supply positively influenced HDI by increasing liquidity and supporting economic activities. The study concluded that monetary expansion can improve welfare when properly managed and recommended efficient allocation of financial resources to productive sectors.

Ibrahim and Yusuf (2024) examined monetary policy and economic development in Nigeria using time-series regression analysis covering 1990–2022. Secondary data from national economic reports were used, with emphasis on money supply and human development indicators. The findings revealed that M2 had a significant positive effect on HDI, indicating that increased liquidity could support welfare improvements. The study recommended balancing monetary expansion with price stability to sustain development outcomes.

Lawal and Akinwale (2024) investigated the effects of money supply and open market operations on human development in Nigeria between 1990 and 2022, employing the ARDL technique with secondary data from national statistical sources. Results showed that M2 positively and significantly affected HDI, whereas TBVOL was insignificant. The authors recommended strengthening financial markets to improve liquidity transmission and enhance the developmental effects of monetary policy.

Putri and Santoso (2024) analyzed monetary transmission channels and welfare outcomes in Indonesia from 2000 to 2022 using panel data and econometric techniques. The study compared credit and interest-rate transmission channels and found that credit channels were more effective in influencing human development outcomes than interest-rate channels. The authors concluded that expanding access to credit is essential for improving welfare and recommended stronger financial inclusion and credit-delivery mechanisms.

Ojo and Musa (2023) examined monetary policy transmission effectiveness in Nigeria using time-series data covering 1986–2021 and Vector Autoregression (VAR) techniques. Data were sourced from the CBN Statistical Bulletin. Findings revealed that weak transmission mechanisms significantly constrained the effects of monetary policy variables on real-sector performance and welfare. The authors attributed this to financial-system structural inefficiencies and recommended stronger financial intermediation and institutional frameworks.

Ogunleye and Adeosun (2023) investigated the effects of MPR and PLR on economic development in Nigeria over 2000–2021 using time-series data and the Vector Error Correction Model (VECM). Findings showed that interest-rate variables had weak and insignificant transmission effects on HDI. The study concluded that financial-system inefficiencies weakened monetary policy effectiveness and recommended comprehensive financial-sector reforms to strengthen interest-rate transmission to real-sector activities.

## V. RESEARCH METHODOLOGY

The study adopted an *ex-post facto* research design to examine the relationship between monetary policy instruments and economic development in Nigeria using historical data without manipulating the variables. The design was appropriate because MPR, TBVOL, M2, CRR, and HDI are macroeconomic variables that cannot be controlled by the researcher. The population comprised the Nigerian economy, covering economic activities and sectors influenced by monetary policy and development outcomes, including the financial, productive, health, and

education sectors. The sample consisted of MPR, TBVOL, M2, CRR, and HDI, selected purposively based on their theoretical and empirical relevance to the study. Secondary data covering 2001–2025 were obtained from the Central Bank of Nigeria Statistical Bulletin and Annual Reports, while HDI data were obtained from the National Bureau of Statistics and other relevant publications. The use of secondary data provided consistent information for examining long-term relationships among the study variables.

The study employed OLS regression using E-Views 9.0 to determine the effects of monetary policy instruments on HDI. Descriptive statistics, including mean, standard deviation, skewness, and kurtosis, were used to summarize the characteristics of the data, while correlation analysis examined the degree of association among variables. The Variance Inflation Factor (VIF) was used to assess multicollinearity, with values above 10 indicating a potential multicollinearity problem. Model adequacy was evaluated using the coefficient of determination ( $R^2$ ), F-statistic, and Durbin-Watson statistic, with values close to 2 suggesting the absence of serious autocorrelation. A Group Unit Root Test was conducted to determine the stationarity of the variables, with a probability value below 0.05 indicating stationarity. The Johansen Cointegration Test was subsequently employed to establish whether a long-run equilibrium relationship existed among the variables, with rejection of the null hypothesis indicating cointegration.

The OLS regression model was estimated to determine the effect of independent variables on the dependent variable. The model will be specified as:

$$\text{HDI} = \beta_0 + \beta_1\text{MPR} + \beta_2\text{TBVOL} + \beta_3\text{M2} + \beta_4\text{CRR} + \mu$$

Where HDI denotes Human Development Index, MPR represents Monetary Policy Rate, TBVOL denotes Treasury Bill Volume, M2 represents Money Supply, CRR denotes Cash Reserve Ratio,  $\beta_0$  is the intercept,  $\beta_1$ – $\beta_5$  are coefficients, and  $\mu$  is the error term.

## VI. RESULTS AND DISCUSSION

The study employed econometric techniques to examine the relationship between monetary policy instruments and HDI in Nigeria. Descriptive statistics and correlation analysis were first conducted, followed by multicollinearity diagnostics. Further tests assessed normality, serial correlation, heteroskedasticity, model specification, and parameter stability. Stationarity and long-run relationships were also examined. Finally, OLS regression was estimated

using annual data from 2001–2025 to determine the individual and combined effects of MPR, TBVOL, M2, and CRR on HDI.

### Descriptive Statistics

This test summarized the mean, standard deviation, minimum, maximum, skewness, and kurtosis of MPR, TBVOL, M2, CRR, and HDI, revealing their distribution, variability, and stability from 2001–2025.

Table 1: Descriptive Statistics

|              | HDI       | LOGMPR    | LOGTBVOL  | LOGM2     | LOGCRR   |
|--------------|-----------|-----------|-----------|-----------|----------|
| Mean         | 0.550680  | 1.115050  | 3.275563  | 4.112563  | 1.259551 |
| Median       | 0.556000  | 1.113943  | 3.322219  | 4.130334  | 1.230449 |
| Maximum      | 0.625000  | 1.431364  | 3.845098  | 4.845098  | 1.439333 |
| Minimum      | 0.466000  | 0.778151  | 2.544068  | 3.178977  | 1.198657 |
| Std. Dev.    | 0.050694  | 0.146232  | 0.377173  | 0.503677  | 0.061035 |
| Skewness     | -0.180755 | -0.114079 | -0.342307 | -0.320071 | 1.525241 |
| Kurtosis     | 1.730416  | 4.118794  | 2.088738  | 1.968046  | 4.747855 |
| Jarque-Bera  | 1.815138  | 1.358080  | 1.353225  | 1.536156  | 12.87545 |
| Probability  | 0.403504  | 0.507104  | 0.508336  | 0.463904  | 0.071600 |
| Sum          | 13.76700  | 27.87626  | 81.88907  | 102.8141  | 31.48877 |
| Sum Sq. Dev. | 0.061677  | 0.513213  | 3.414234  | 6.088565  | 0.089408 |
| Observations | 25        | 25        | 25        | 25        | 25       |

Table 1 presents the descriptive statistics for HDI, MPR, TBVOL, M2, and CRR over 2001–2025. HDI recorded a mean of 0.550680, while MPR, TBVOL, M2, and CRR averaged 1.115050, 3.275563, 4.112563, and 1.259551, respectively. The standard deviations indicate varying levels of dispersion, with M2 showing relatively greater fluctuations. Skewness and kurtosis revealed differences in the distributional patterns of the variables. However, the Jarque-Bera probabilities for all variables exceeded 0.05, indicating that the null hypothesis of normality was

not rejected. Thus, the variables exhibited acceptable distributional properties and were suitable for further OLS regression analysis.

### Correlation Matrix

The correlation matrix examined the direction and strength of relationships among HDI, MPR, TBVOL, M2, and CRR, while identifying potential multicollinearity among explanatory variables.

Table 2: Correlation Matrix

|          | HDI      | LOGMPR   | LOGTBVOL | LOGM2    | LOGCRR |
|----------|----------|----------|----------|----------|--------|
| HDI      | 1.000000 |          |          |          |        |
| LOGMPR   | 0.392403 | 1.000000 |          |          |        |
| LOGTBVOL | 0.494392 | 0.348030 | 1.000000 |          |        |
| LOGM2    | 0.493563 | 0.328000 | 0.497278 | 1.000000 |        |

LOGCRR 0.075037 0.491318 0.050014 0.037853 1.000000

Table 2 presents the correlation matrix for HDI, MPR, TBVOL, M2, and CRR. The results indicate positive relationships between HDI and MPR (0.392403), TBVOL (0.494392), M2 (0.493563), and CRR (0.075037), with CRR showing the weakest association. Among the explanatory variables, the highest correlation was between TBVOL and M2 (0.497278). Since all correlations among the independent variables were below 0.50, no strong linear relationships were observed. This suggests that serious multicollinearity may not exist among the explanatory variables. The results therefore provide

preliminary support for their inclusion in the OLS model, subject to further confirmation using the VIF test.

#### Variance Inflation Factor (VIF) Test

The VIF test assessed multicollinearity among MPR, TBVOL, M2, and CRR. Values below 10 indicate no serious multicollinearity, while values above 10 suggest severe multicollinearity affecting regression estimates.

Table 3: Variance Inflation Factor (VIF) Test

Variance Inflation Factors

Date: 07/25/26 Time: 20:57

Sample: 2001 2025

Included observations: 25

| Variable | Coefficient |          |          |
|----------|-------------|----------|----------|
|          | Uncentered  | Centered |          |
|          | Variance    | VIF      | VIF      |
| C        | 0.000764    | 33.70851 | NA       |
| LOGMPR   | 0.011005    | 32.39488 | 5.261783 |
| LOGTBVOL | 0.000544    | 26.08547 | 3.278590 |
| LOGM2    | 0.000399    | 30.19072 | 4.285625 |
| LOGCRR   | 0.000223    | 15.61906 | 3.513016 |

Table 3 presents the VIF results for MPR, TBVOL, M2, and CRR. Their centered VIF values were 5.261783, 3.278590, 4.285625, and 3.513016, respectively. All values were below the threshold of 10, indicating no severe multicollinearity among the explanatory variables. Although MPR recorded the highest VIF (5.261783), it remained within the acceptable range. Therefore, the monetary policy variables provide sufficiently distinct information, and multicollinearity does not significantly distort the OLS estimates. The results confirm the suitability of MPR,

TBVOL, M2, and CRR for inclusion in the regression model and support the reliability of subsequent estimates.

#### Model Validity Test

The model validity test examined whether the estimated regression model was correctly specified and statistically dependable for empirical analysis. The findings are presented in Table 4.

Table 4: Model Validity Test

Breusch-Godfrey Serial Correlation LM Test:

|               |          |                     |        |
|---------------|----------|---------------------|--------|
| F-statistic   | 1.837727 | Prob. F(2,17)       | 0.1894 |
| Obs*R-squared | 4.444225 | Prob. Chi-Square(2) | 0.1084 |

Heteroskedasticity Test: Breusch-Pagan-Godfrey

|                     |          |                     |        |
|---------------------|----------|---------------------|--------|
| F-statistic         | 0.347657 | Prob. F(5,19)       | 0.8774 |
| Obs*R-squared       | 2.095500 | Prob. Chi-Square(5) | 0.8358 |
| Scaled explained SS | 0.932183 | Prob. Chi-Square(5) | 0.9678 |

Ramsey RESET Test

Equation: UNTITLED

Specification: HDI C LOGMPR LOGTBVOL LOGM2 LOGCRR

Omitted Variables: Squares of fitted values

|                  | Value    | Df      | Probability | Value    |
|------------------|----------|---------|-------------|----------|
| t-statistic      | 2.147461 | 18      | 0.1356      | 2.147461 |
| F-statistic      | 4.611589 | (1, 18) | 0.1456      | 4.611589 |
| Likelihood ratio | 5.702270 | 1       | 0.0769      | 5.702270 |

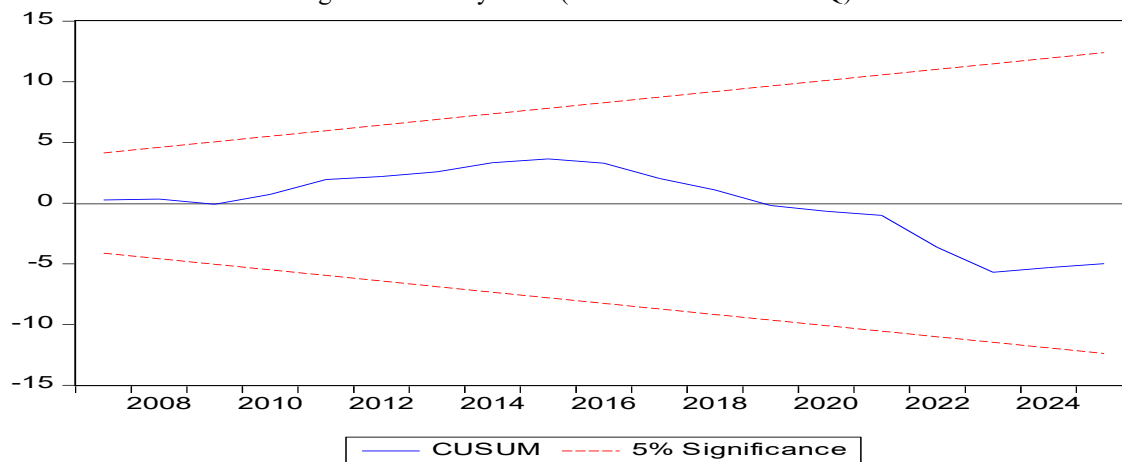
The Breusch-Godfrey Serial Correlation LM test reports an F-statistic of 1.837727 with a probability value of 0.1894, while the ObsR-squared probability is 0.1084. Since both exceed 0.05, the null hypothesis of no serial correlation is not rejected, indicating that the model's residuals are free from significant autocorrelation. The Breusch-Pagan-Godfrey Heteroskedasticity test produces an F-statistic probability of 0.8774 and an ObsR-squared probability of 0.8358, confirming homoskedasticity. The Ramsey RESET test records an F-statistic probability of

0.1456, which exceeds 0.05, suggesting no significant model specification error. Thus, the regression model satisfies the key diagnostic requirements for reliable estimation.

Stability Tests (CUSUM and CUSUMSQ)

Stability tests assessed whether the regression parameters remained consistent from 2001–2025, with CUSUM and CUSUMSQ confirming stability when plots remained within the 5% critical boundaries.

Figure 1: Stability Tests (CUSUM and CUSUMSQ)



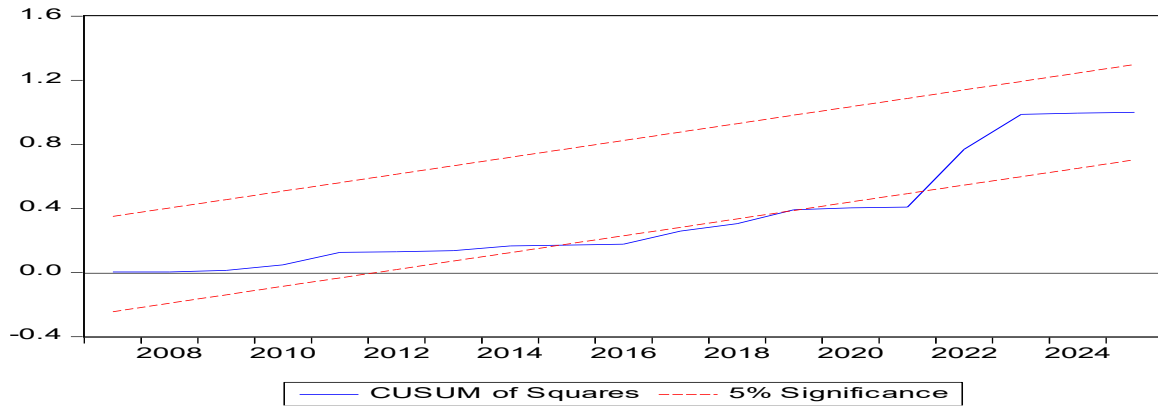


Figure 1 presents the CUSUM and CUSUMSQ stability tests for the OLS model over 2001–2025. The tests examined whether the estimated coefficients for MPR, TBVOL, M2, and CRR remained stable in explaining HDI. The results show that both CUSUM and CUSUMSQ plots remained within the 5% critical boundaries throughout the study period, indicating no evidence of structural instability or parameter shifts. Thus, the relationship between monetary policy instruments and economic development remained consistent despite changes in Nigeria's

macroeconomic environment. Based on the decision rule, the null hypothesis of parameter stability is accepted. Therefore, the OLS model satisfies the stability condition and is suitable for interpretation.

#### Group Unit Root Test

The Group unit root test assessed stationarity of HDI and monetary policy variables. A probability value below 0.05 rejects the unit-root null hypothesis, confirming stationarity.

Table 5: Group Unit Root Test

Group unit root test: Summary @ Level  
Series: HDI, LOGMPR, LOGTBVOL, LOGM2, LOGCRR  
Date: 07/25/26 Time: 21:08  
Sample: 2001 2025  
Exogenous variables: Individual effects  
Automatic selection of maximum lags  
Automatic lag length selection based on SIC: 0 to 4  
Newey-West automatic bandwidth selection and Bartlett kernel

| Method                                                 | Statistic | Prob.** | Cross-sections | Obs |
|--------------------------------------------------------|-----------|---------|----------------|-----|
| Null: Unit root (assumes common unit root process)     |           |         |                |     |
| Levin, Lin & Chu t*                                    | -1.78300  | 0.0373  | 6              | 137 |
| Null: Unit root (assumes individual unit root process) |           |         |                |     |
| Im, Pesaran and Shin W-stat                            | 1.04219   | 0.8513  | 6              | 137 |
| ADF - Fisher Chi-square                                | 5.79763   | 0.9259  | 6              | 137 |
| PP - Fisher Chi-square                                 | 22.5288   | 0.0320  | 6              | 144 |

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Group unit root test: Summary @ 1<sup>st</sup> Difference

Series: HDI, LOGMPR, LOGTBVOL, LOGM2, LOGCRR  
Date: 07/25/26 Time: 21:12  
Sample: 2001 2025  
Exogenous variables: Individual effects  
Automatic selection of maximum lags  
Automatic lag length selection based on SIC: 0 to 3  
Newey-West automatic bandwidth selection and Bartlett kernel

| Method                                                 | Statistic | Prob.** | Cross-sections | Obs |
|--------------------------------------------------------|-----------|---------|----------------|-----|
| Null: Unit root (assumes common unit root process)     |           |         |                |     |
| Levin, Lin & Chu t*                                    | -3.94785  | 0.0000  | 6              | 135 |
| Null: Unit root (assumes individual unit root process) |           |         |                |     |
| Im, Pesaran and Shin W-stat                            | -3.89186  | 0.0000  | 6              | 135 |
| ADF - Fisher Chi-square                                | 37.6455   | 0.0002  | 6              | 135 |
| PP - Fisher Chi-square                                 | 32.1293   | 0.0013  | 6              | 138 |

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Table 5 presents the Group unit root test for HDI, MPR, TBVOL, M2, and CRR. The results at level were mixed, with Levin, Lin and Chu and PP-Fisher indicating stationarity, while Im, Pesaran and Shin and ADF-Fisher suggested unit roots. However, after first differencing, all test statistics produced probability values below 0.05, confirming stationarity. Specifically, Levin, Lin and Chu and Im, Pesaran and Shin recorded 0.0000, while ADF-Fisher and PP-Fisher recorded 0.0002 and 0.0013, respectively. Thus, the null hypothesis of a unit root is rejected at

first difference, indicating that all variables are integrated of order one, I(1), and suitable for further cointegration analysis.

#### Johansen Cointegration Test

The test examined long-run relationships among HDI, MPR, TBVOL, M2, and CRR. Cointegration exists when trace or maximum eigenvalue statistics exceed critical values at 5%.

Table 6: Johansen Cointegration Test

Date: 07/25/26 Time: 21:13  
Sample (adjusted): 2003 2025  
Included observations: 23 after adjustments  
Trend assumption: Linear deterministic trend  
Series: HDI LOGMPR LOGTBVOL LOGM2 LOGCRR  
Lags interval (in first differences): 1 to 1

#### Unrestricted Cointegration Rank Test (Trace)

| Hypothesized | Trace      | 0.05      |                |         |
|--------------|------------|-----------|----------------|---------|
| No. of CE(s) | Eigenvalue | Statistic | Critical Value | Prob.** |
| None *       | 0.943080   | 181.3175  | 95.75366       | 0.0000  |
| At most 1 *  | 0.919712   | 115.3969  | 69.81889       | 0.0000  |

|             |          |          |          |        |
|-------------|----------|----------|----------|--------|
| At most 2 * | 0.751829 | 57.38787 | 47.85613 | 0.0050 |
| At most 3   | 0.732697 | 55.33425 | 45.79707 | 0.0148 |
| At most 4   | 0.764757 | 58.29645 | 48.49471 | 0.0033 |
| At most 5   | 0.877697 | 86.10263 | 83.41466 | 0.0000 |

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized<br>No. of CE(s) | Eigenvalue | Max-Eigen<br>Statistic | 0.05<br>Critical Value | Prob.** |
|------------------------------|------------|------------------------|------------------------|---------|
| None *                       | 0.943080   | 65.92056               | 40.07757               | 0.0000  |
| At most 1 *                  | 0.919712   | 58.00903               | 33.87687               | 0.0000  |
| At most 2 *                  | 0.751829   | 32.05361               | 27.58434               | 0.0124  |
| At most 3                    | 0.532697   | 53.03780               | 51.13162               | 0.0000  |
| At most 4                    | 0.564757   | 60.43618               | 54.26460               | 0.0000  |
| At most 5                    | 0.877697   | 86.10263               | 83.41466               | 0.0000  |

Table 6 presents the Johansen cointegration results for HDI, MPR, TBVOL, M2, and CRR. The Trace test confirms cointegration, with a statistic of 181.3175 exceeding the 5% critical value of 95.75366 and a probability of 0.0000. At most one and two cointegrating relationships were also significant, with probabilities of 0.0000 and 0.0050, respectively, indicating three cointegrating equations. The Maximum Eigenvalue test similarly confirms cointegration, recording 65.92056 against a critical value of 40.07757 ( $p = 0.0000$ ). Thus, the variables

maintain a stable long-run equilibrium relationship, supporting further estimation of the monetary policy-development relationship over 2001–2025.

#### Ordinary Least Square Regression

The OLS regression examined the effects of MPR, TBVOL, M2, and CRR on HDI in Nigeria from 2001–2025. A probability value below 0.05 indicates a statistically significant effect, while values above 0.05 indicate insignificance.

Table 7: Ordinary Least Square Regression

Dependent Variable: HDI

Method: Least Squares

Date: 07/25/26 Time: 20:57

Sample: 2001 2025

Included observations: 25

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| C        | 0.317581    | 0.027643   | 11.48850    | 0.0000 |
| LOGMPR   | 0.033857    | 0.007623   | 4.441427    | 0.0000 |
| LOGTBVOL | -0.052537   | 0.023329   | -2.252042   | 0.0363 |
| LOGM2    | -0.035621   | 0.019973   | -1.783483   | 0.0905 |
| LOGCCRR  | -0.078482   | 0.014923   | -5.259273   | 0.0000 |

|                    |          |                       |           |
|--------------------|----------|-----------------------|-----------|
| R-squared          | 0.998254 | Mean dependent var    | 0.550680  |
| Adjusted R-squared | 0.997795 | S.D. dependent var    | 0.050694  |
| S.E. of regression | 0.002381 | Akaike info criterion | -9.037343 |
| Sum squared resid  | 0.000108 | Schwarz criterion     | -8.744813 |
| Log likelihood     | 118.9668 | Hannan-Quinn criter.  | -8.956208 |
| F-statistic        | 2172.776 | Durbin-Watson stat    | 2.036594  |
| Prob(F-statistic)  | 0.000000 |                       |           |

Table 7 presents the OLS regression results for the effects of MPR, TBVOL, M2, and CRR on HDI in Nigeria from 2001–2025, based on 25 observations. The  $R^2$  of 0.998254 shows that 99.83% of variations in HDI are jointly explained by the monetary policy variables, while the adjusted  $R^2$  of 0.997795 confirms strong explanatory power. The F-statistic of 2172.776 with a probability of 0.0000 indicates that the variables jointly have a statistically significant effect on HDI. The Durbin-Watson value of 2.036594 suggests no serious autocorrelation. Additionally, the constant coefficient of 0.317581 is positive and statistically significant at the 5% level.

The findings showed that MPR has a positive and statistically significant effect on HDI, with a coefficient of 0.033857 and probability value of 0.0000. This indicates that increases in MPR were associated with improvements in human development during 2001–2025. The finding supports the Keynesian Theory of Money, which emphasizes the influence of interest rates on investment, aggregate demand, income, and economic activity. However, it contradicts Hassan and Bello (2025), who found a negative significant short-run effect of MPR on HDI, and Ogunleye and Adeosun (2023), who reported insignificant effects. The difference may reflect variations in economic conditions, study periods, and monetary transmission mechanisms.

The findings indicated that TBVOL has a negative and statistically significant effect on HDI, with a coefficient of -0.052537 and probability value of 0.0363. This suggests that increases in Treasury Bill Volume were associated with reductions in human development. The finding aligns with the Keynesian Theory of Money because restrictive monetary operations can reduce liquidity available for investment, credit, and economic activity. It is partly consistent with Lawal and Akinwale (2024), who

found TBVOL insignificant, while Ojo and Musa (2023) reported weak monetary transmission in Nigeria. The negative relationship suggests that increased Treasury bill operations may constrain productive-sector financing, thereby limiting investment, employment, income generation, and welfare improvements.

The findings revealed that M2 has a negative but statistically insignificant effect on HDI, with a coefficient of -0.035621 and probability value of 0.0905. This indicates that changes in money supply did not significantly influence human development during the study period. The result is consistent with the Quantity Theory of Money, which suggests that monetary expansion does not necessarily improve real economic outcomes when increased liquidity is not matched by productive capacity. However, it contradicts Diop and Fall (2024), Ibrahim and Yusuf (2024), and Lawal and Akinwale (2024), who reported positive effects of M2 on HDI. The difference may reflect inflationary pressures, financial constraints, and differences in study periods and methodologies.

The findings showed that CRR has a negative and statistically significant effect on HDI, with a coefficient of -0.078482 and probability value of 0.0000. This implies that increases in CRR were associated with reductions in human development. The finding supports the Keynesian Theory of Money because higher reserve requirements can reduce banks' lending capacity, affecting investment, employment, income, and economic activity. It is also consistent with Salisu and Bamidele (2024), who emphasized effective financial intermediation in monetary policy transmission, and Putri and Santoso (2024), who highlighted the importance of credit channels for welfare outcomes. The result suggests that tighter reserve requirements may constrain

productive lending and limit improvements in human development.

## VII. CONCLUSION

The study concluded that monetary policy significantly influenced the development of the Nigerian economy during 2001–2025. MPR had a positive and statistically significant effect on HDI, while TBVOL and CRR exerted negative and statistically significant effects. M2 had a negative but statistically insignificant effect on HDI. The findings further established that monetary policy instruments jointly explained a substantial proportion of variations in human development, indicating their importance in shaping economic outcomes. The study therefore concluded that the developmental effects of monetary policy depend on the specific instrument employed and the effectiveness of its transmission mechanisms. Appropriate monetary policy management is essential for promoting investment, credit access, employment, welfare, and sustainable economic development in Nigeria.

## VIII. RECOMMENDATIONS

Based on the findings, the study recommended that:

- i. The Central Bank of Nigeria should adopt balanced MPR adjustments that maintain monetary stability while avoiding excessive borrowing costs that could constrain productive investment, employment, and economic activity.
- ii. Monetary authorities should improve Treasury bill operations to prevent excessive liquidity absorption and ensure adequate funds remain available for productive-sector financing, private investment, business expansion, and employment creation.
- iii. The CBN should strengthen measures that channel increases in M2 toward productive investment, employment, and output rather than activities that intensify inflationary pressures without improving human development outcomes.
- iv. CRR adjustments should be carefully calibrated to preserve banking-system stability while maintaining sufficient lending capacity.

Complementary credit-access measures should support businesses and households, especially productive sectors contributing to employment, income generation, and welfare improvement. Reviews should assess effects on investment and welfare.

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