

Long Run and Causal Dynamics of Financial Deepening On Money Supply in Nigeria: Evidence from a VAR Model

Ishaka Audu Jimoh, O. G. Wafure, Ahmad B. El-Yaqub

Department of Economics, University of Abuja, Nigeria

ABSTRACT

Globally, financial deepening has been vital in fostering economic growth and stability. Financial deepening envelops the expansion in monetary resources. This study examined the impact of the financial deepening indicators on money supply in Nigeria, by observing the independent contributions of money supply, market capitalization, credit to private sector, all share index, access to financial services and financial inclusion to the growth of the economy, using annual series data between 1986 and 2024. By basing the study on Vector Autoregressive Estimates methods of analyses, the results indicated that while market capitalization and access to financial services had positive and statistically significant impact on the money supply over time, credit to private sector, all share index and financial inclusion declined and the outcomes in terms of money supply growth and development were statistically insignificant, implying that the deepening of the financial system in the country was insignificant as its impact on the economy was found to be majorly negative. The Granger Causality Test result shows that there is existence of independence between credit to private sector and money supply; between money supply and market capitalization; between access to financial services and money supply; between money supply and all share index and between financial inclusion and money supply in Nigeria. Suggesting that financial deepening does not cause money supply in Nigeria. Thus, the study, recommended that monetary authority especially the central bank and commercial banks should allocate credit to the private sector. Sectors such as agricultural sector and industrial sector should be considered as the vital instrument for economic growth and development machinery and formulate laws to check the loans defaulter. More so, the monetary authority should regulate her policy rates and other policies, like the cash reserve ratio, to increase the level of banking system liquidity. By this it will automatically increase banks' lending size to the private sector. The study also recommended financial liberalization in the economy and the need to ease financial repression, helps in regulating credit controls and allowing market to determined real interest rates.

KEYWORDS

VAR Model, Financial Deepening Indicators, Money Supply, Nigeria

I. INTRODUCTION

Financial deepening refers to the enlargement and increased complexity of financial systems, including the development of financial markets, institutions, and products that improve access to capital and augment the efficacy of resource allocation. Globally, financial deepening has been vital in fostering economic growth and stability. Also, the World Bank (2022) observes that financial deepening envelops the expansion in monetary resources.

According to King and Levine (1993), well-developed financial systems play a key role, in promoting investment and economic development, by sinking the costs of capital and attractive risk management. Countries with progressive financial markets, such as the United States, Japan, and Germany, have shown how financial deepening can support high levels of economic growth and technological innovation. However, the effort of Schumpeter (1911) and other researchers such as McKinnon (1973) and Shaw (1973) have recognized that the development of the financial sector has productivity and growth improving effects. Consequently, the relationship between financial deepening indicators and money supply has received considerable attention in both developed and developing economies. This concern about financial deepening and money supply finds its justification in the policy implications that the relationship can bring about, as improved living standards for their citizens as well as increased economic growth rates are the goals required by many governments.

Financial deepening has been one of the policy priorities in Nigeria since the introduction of the Structural Adjustment Programme (SAP) in 1986 that sought the liberalization of financial sector and enhance the effectiveness of monetary management. More reforms followed to enhance financial institutions, increase the credit supply, and develop capital markets and financial inclusion. All these reforms were aimed at boosting internal production, sustaining prices, minimizing unemployment/inflation, and alleviating balance of payment stress. Against this goal, Central Bank of Nigeria (CBN) has implemented capital requirements on banks in order to enhance their ability to fund real sector investment and economic growth.

Although these have been done, financial deepening is still hampered by structural challenges that exist in the Nigerian financial system. These are high inflation, fluctuation of the exchange rates and over-reliance on oil revenues which expose the economy to external shocks. Despite the banking industry becoming more resilient, the bank loan to the private sector is not high, and the supply of finance to small and medium-sized businesses is still inaccessible. Moreover, the capital market is still shallow, and financial inclusion which is increasing with the help of mobile banking and microfinance projects is not at its optimal stage.

Since the early 2000s, financial deepening in Nigeria has been more directed towards expansion of financial inclusion, digital financial services and diversification of the economy beyond depending on oil. There exist however, some concerns on how far these developments have been translated into effective monetary expansion and performance of the financial sector. The overall effect of financial deepening on the macroeconomic performance remains limited due to limited access to banking services, poor capital markets, poor credit transmission systems, and financial instability.

In the background of Nigeria, financial deepening has been a dominant policy objective since the country's economic reforms in 1986, following the implementation of the Structural Adjustment Program (SAP). Regardless of several measures aimed at refining the deepness of the financial system, Nigeria's financial sector has faced trials, including limited access to banking services, insufficient financial inclusion, underdeveloped capital markets, and issues of financial stability. These trials have impacted the effectiveness of financial deepening in

promoting broader macroeconomic performance, which includes growth in GDP, inflation control, employment generation, and poverty reduction.

A. *Statement of the Problem*

Although over decades, Nigeria has undergone financial sector reforms to deepen its financial system, such as the development of its capital markets, credit growth, and financial inclusion, the empirical evidence of such efforts on money supply is not clear and is contested. There are also structural issues, including high inflation, volatility of exchange rates, and shallow capital markets, and the existing empirical data are contradictory: some researchers find a positive relationship between credit to the private sector and market capitalization and growth, but others report In addition, the majority of the previous studies consider the economic growth or alleviation of poverty instead of directly addressing money supply, and most of them employ one or two proxies of financial deepening through conventional estimation techniques (ARDL, OLS), which are unable to capture the dynamic, multivariate relationship among The particular gap that the present study addresses is that no prior study has used a Vector Autoregressive (VAR) or Vector Error Correction Model (VECM) framework with recent annual data (1986-2024) to concurrently examine the long-run equilibrium and causal relationships among these six financial deepening variables and money supply in Nigeria.

B. *Aim*

The main aim of this study is to examine the impact and dynamic relationships between financial deepening indicators and money supply in Nigeria in order to assess the effectiveness of financial sector development in strengthening monetary expansion.

C. *The objectives of the study were to:*

- Examine the effect of market capitalization on money supply in Nigeria.
- Assess the impact of access to financial services on money supply in Nigeria.
- Determine the influence of credit to the private sector on money supply in Nigeria.
- Examine the long-run and relationships between financial deepening indicators and money supply in Nigeria.

II. **LITERATURE REVIEW**

This paper briefly explains the literature reviews of the existing research, particularly, on Positive Impact of Financial Deepening on Economic Growth, Role of Digital Finance and Financial Inclusion, and Weak or Negative Transmission of Financial Deepening. There are varying results on previous research on financial Deepenings on economic growth, such as; Ozor et al. (2023) Found money supply was positively and significantly related to economic growth, but credit to the private sector was negatively related, demonstrating inefficiencies. In their own study, Okete & Camillus (2024) suggest that credit to private sector and market capitalization significantly favour economic growth, but money supply and lending rate did not play important roles.

Likewise, Zakari and Mohammed (2025) highlight that positive impact of financial deepening on growth and low causality between financial development and macroeconomic variables. Adamgbo et al. (2024) Digital financial services play a major role in fostering financial deepening through increasing access and inclusivity.

Musa et al. (2024) further claimed that one of the vital pathways through which monetary growth can influence the real sector is financial inclusion (bank departments, electronic mediums). Although Yahaya and El-Rasheed (2024) revealed that although financial innovation and literacy work to improve inclusion, the increase in the money supply may diminish inclusion in the long term. Jimoh, Wafure & El-Yaqub (2026), noted that Broad money supply, all share index, and financial inclusion positively affected the long-run but credit to private sector, market capitalization and access to financial services had negative/insignificant impacts. No causal link between deepening indicators and growth.

Similarly, Obunike-Ezeuli et al. (2024) confirm that Strong financial intermediation lowers poverty, but too much monetary growth has adverse distributional implications. Nwosa (2018) alleged that disagreed with the positive results on market capitalization (as a counterpoint result). Wafure and Nurudeen (2010) have claimed that the determinants of FDI in Nigeria are market size, deregulation and political instability (indirectly associated with financial deepening).

In a different study Danrimi and Badawaire (2025) have reported that Demographic pressures also play a major role in determining GDP and that structural factors (including financial policies) play an important role in sustainable growth. Although existing studies have contributed, however, most recent studies concentrate on the link between financial deepening and economic growth or poverty alleviation, but not on money supply. Numerous studies employ a single or two proxies to financial deepening (e.g., credit to private sector alone). Most of them make use of the conventional methods of estimation (ARDL, OLS) and are not using multivariate dynamic models (VAR, VECM). There is conflicting evidence available and no consensus exists on whether financial deepening is effective in transmitting to monetary variables.

III. METHODOLOGY

A. Data Description

The study utilizes secondary data obtained from the central Bank of Nigeria (CBN) Statical Bulletin for the period 1986 to 2024.

The variables in the Study were abbreviated as follows;

- MS: Money supply
- MC: market consumption
- CPS: Credit to Private Sector
- ASI: Access to Financial Service
- FI: Financial Inclusion

B. Vector Autoregressive Estimates

The VAR models are commonly used to forecast and analyse the impact of random disturbances on economic systems with multiple time series. They allow researchers to investigate relationships between variables without having to designate them as independent or dependent. Examining bidirectional causal consequences throughout time aligns with this purpose.

In the context of vector autoregressive models, we define $Y_t = (Y_{1t}, Y_{2t}, \dots, Y_{nt})^T$ as an $n \times 1$ vector representing time series variables. The basic p -lag VAR (p) model is structured as:

$$Y_t = C + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \dots + \beta_p Y_{t-p} + \varepsilon_t, t = 1, \dots, T \quad (1)$$

Where:

$Y_t = n \times 1$ vector of endogenous variables (money supply, market capitalization, credit to private sector, all share index, access to financial services, financial inclusion)

- C = constant vector
- β_i = coefficient matrices
- ε_t = white noise error term
- (Sims, C. A. (1980))

C. Vector Error Correction Model (VECM) Johansen (1991)

A Vector Error Correction Model (VECM) can be set up as a simple, proportional, long-run equilibrium relationship between two variables:

$$Y_t = KX_t \quad (2)$$

In logarithmic form, this becomes:

$$y_t = k + x_t \quad (3)$$

Where

$$y_t = \ln(Y_t), x_t = \ln(X_t) \text{ and } k = \ln(K).$$

The presence of counteraction among variables suggests modelling the data using a VECM (a system of multivariate linear models) or, for a univariate case, an ECM. The residual terms μ_t (or ε_t) are assumed to satisfy standard distributional assumptions, enabling inference on the model parameters and interpretation of the regression coefficients $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$

For cointegrated series, the VECM is expressed as:

$$\Delta Y_t = \beta_0 + \beta_1 \Delta x_{1t} + \beta_2 \Delta x_{t-1} + \dots + \lambda(x_{t-1} - y_{t-1}) + \mu_t \quad (4)$$

Where:

- Δ = first difference operator
- λ = error correction coefficient
- $(x_{t-1} - y_{t-1})$ = long-run equilibrium error (ECT)
- μ_t = residual term

D. Expanded VECM for Money Supply (LM2) Jimoh, Wafure & El-Yaqub (2026)

The explicit form of the VECM for money supply is:

Equation for $\Delta LM2$ (Money Supply):

$$\begin{aligned} \Delta LM2_t = & \beta_0 + \sum_{i=1}^m \beta_{1i} \Delta LM2_{t-i} + \sum_{i=1}^{n_1} \beta_{2i} \Delta LMC_{t-i} + \sum_{i=1}^{n_2} \beta_{3i} \Delta LCPS_{t-i} \\ & + \sum_{i=1}^{n_3} \beta_{4i} \Delta LASI_{t-i} + \sum_{i=1}^{n_4} \beta_{5i} \Delta LAFS_{t-i} + \sum_{i=1}^{n_5} \beta_{6i} \Delta LFI_{t-i} \\ & + \lambda_7 ECT_{t-1} + \varepsilon_{1t} \end{aligned} \quad (5)$$

Equation for ΔLMC (Market Capitalization):

$$\begin{aligned} \Delta LMC_t = & \alpha_0 + \sum_{i=1}^m \beta_{1i} \Delta LMC_{t-i} + \sum_{i=1}^{n_1} \beta_{2i} \Delta LM2_{t-i} + \sum_{i=1}^{n_2} \beta_{3i} \Delta LCPS_{t-i} \\ & + \sum_{i=1}^{n_3} \beta_{4i} \Delta LASI_{t-i} + \sum_{i=1}^{n_4} \beta_{5i} \Delta LAFS_{t-i} + \sum_{i=1}^{n_5} \beta_{6i} \Delta LFI_{t-i} \\ & + \lambda_7 ECT_{t-1} + \varepsilon_{2t} \end{aligned} \quad (6)$$

Equation for $\Delta LCPS$ (Credit to Private Sector):

$$\begin{aligned} \Delta LCPS_t = & \omega_0 + \sum_{i=1}^m \beta_{1i} \Delta LCPS_{t-i} + \sum_{i=1}^{n_1} \beta_{2i} \Delta LASI_{t-i} + \sum_{i=1}^{n_2} \beta_{3i} \Delta LAFS_{t-i} \\ & + \sum_{i=1}^{n_3} \beta_{4i} \Delta LFI_{t-i} + \sum_{i=1}^{n_4} \beta_{5i} \Delta LMC_{t-i} + \sum_{i=1}^{n_5} \beta_{6i} \Delta LM2_{t-i} \\ & + \lambda_7 ECT_{t-1} + \varepsilon_{3t} \end{aligned} \quad (7)$$

Equation for $\Delta LAFS$ (Access to Financial Services):

$$\begin{aligned} \Delta LAFS_t = & \phi_0 + \sum_{i=1}^m \beta_{1i} \Delta LAFS_{t-i} + \sum_{i=1}^{n_1} \beta_{2i} \Delta LM2_{t-i} + \sum_{i=1}^{n_2} \beta_{3i} \Delta LCPS_{t-i} \\ & + \sum_{i=1}^{n_3} \beta_{4i} \Delta LMC_{t-i} + \sum_{i=1}^{n_4} \beta_{5i} \Delta LASI_{t-i} + \sum_{i=1}^{n_5} \beta_{6i} \Delta LFI_{t-i} \\ & + \lambda_7 ECT_{t-1} + \varepsilon_{4t} \end{aligned} \quad (8)$$

Equation for $\Delta LASI$ (All Share Index):

$$\begin{aligned} \Delta LASI_t = & \eta_0 + \sum_{i=1}^m \beta_{1i} \Delta LASI_{t-i} + \sum_{i=1}^{n_1} \beta_{2i} \Delta LM2_{t-i} + \sum_{i=1}^{n_2} \beta_{3i} \Delta LCPS_{t-i} \\ & + \sum_{i=1}^{n_3} \beta_{4i} \Delta LMC_{t-i} + \sum_{i=1}^{n_4} \beta_{5i} \Delta LAFS_{t-i} + \sum_{i=1}^{n_5} \beta_{6i} \Delta LFI_{t-i} \\ & + \lambda_7 ECT_{t-1} + \varepsilon_{5t} \end{aligned} \quad (9)$$

Equation for ΔLFI (Financial Inclusion):

$$\begin{aligned} \Delta LFI_t = & \vartheta_0 + \sum_{i=1}^m \beta_{1i} \Delta LFI_{t-i} + \sum_{i=1}^{n_1} \beta_{2i} \Delta LM2_{t-i} + \sum_{i=1}^{n_2} \beta_{3i} \Delta LCPS_{t-1} \\ & + \sum_{i=1}^{n_3} \beta_{4i} \Delta LMC_{t-i} + \sum_{i=1}^{n_4} \beta_{5i} \Delta LAFS_{t-i} + \sum_{i=1}^{n_5} \beta_{6i} \Delta LASI_{t-i} \\ & + \lambda_7 ECT_{t-1} + \varepsilon_{6t} \end{aligned} \quad (10)$$

The dynamic features of a VECM are examined using two structural analysis tools:

- Variance Decomposition: Determines the proportional contribution of each variable's variance explained by all variables in the system following a shock.
- Impulse Response Function: Measures the effect of a one-time impulse (shock) in one variable on another variable over subsequent periods.

These constitute the characteristic "error correction" specification, which models the change in a variable as a function of both past changes and the gap (disequilibrium) between variables in the previous period.

Where:

- $LM2$ = Money supply
- LMC = Market capitalization
- $LCPS$ = Credit to private sector
- $LASI$ = All share index (Access to financial services proxy in their notation – note: paper uses LASI for all share index and LAFS for access to financial services)
- $LAFS$ = Access to financial services
- LFI = Financial inclusion
- ECT_{t-1} = Error correction term (lagged one period)

IV. DATA ANALYSIS

Data Analysis in the study was conducted using the E-vies Statistical packages. The decision to use the E-view due to the consideration that E-views is very powerful and is very easier in time series analysis.

A. Empirical results

1. Descriptive Analysis

Table 1: Descriptive Statistics

	LM2	LMC	LCPS	LASI	LAFS	LFI
Mean	14.58429	9.391828	27.90868	11.51533	14.68527	14.52522
Median	14.85042	10.05191	28.00019	12.52746	15.59965	15.42564
Maximum	18.18282	12.91611	29.66375	13.52122	17.47594	17.30343
Minimum	10.21793	4.354141	20.25531	7.494319	8.647572	8.552155
Std. Dev.	2.415111	2.668413	1.726094	1.818737	2.748442	2.699431
Skewness	-0.317603	-0.507525	-2.270565	-0.993786	-1.122513	-1.140724
Kurtosis	1.789711	1.914033	11.05899	2.670478	2.913236	2.962523
Jarque-Bera	2.958121	3.498613	135.4846	6.426793	7.992141	8.243484
Probability	0.227852	0.173894	0.000000	0.040220	0.018388	0.016216
Sum	554.2029	356.8895	1060.530	437.5827	558.0401	551.9582

Sum Sq. Dev.	215.8121	263.4558	110.2378	122.3887	279.4955	269.6164
Observations	38	38	38	38	38	38

Source: computed from E-View 10

The descriptive analysis indicates that there is a lot of difference in the variables across 1986-2024. Money supply has a strong upward momentum, which reflects continuous monetary growth, and financial services and financial inclusion have been improving with time. Conversely, the credit to the private sector, market capitalization and all share index exhibits broad fluctuations indicating instability in banking lending and performance in the capital market. Most of the variables have high standard deviations implying structural volatility in the Nigerian financial system. All the variables are negatively skewed (left-skewed). The only mesokurtic variable (kurtosis > 3) is credit to the private sector (LCPS); the other variables (LM2, LMC, LASI, LAFS, and LFI) are platykurtic (kurtosis < 3).

2. Trends Analysis

The trend analysis explores a visual data representation of the financial and monetary supply

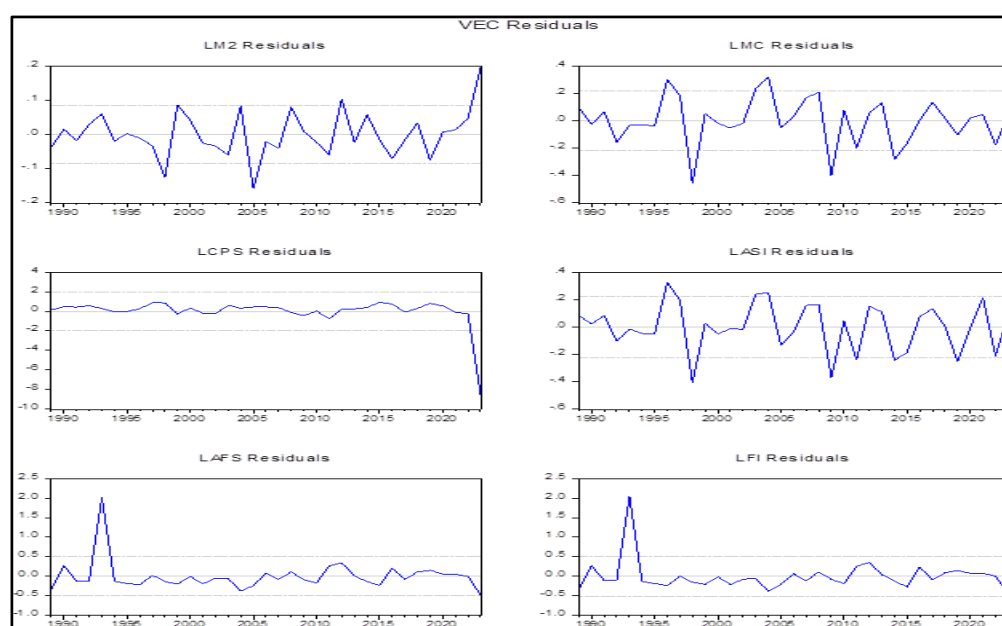


Figure 1: Graph of the Raw Data

The raw data in figure 1 shows that M2 has been gradually increasing and decreasing in 2010 and oscillated over the years. CPS and ASI were relatively constant between 1986 to 1999 then declined to 2000 and gradually increasing to 2010 and skyrocketed in 2015 to 2020 declined, MC also increased gradually over the years; 1986 to 2020 but declined over the years. AFS and FI have been on gradual increment over the years. The plots also showed that all the series exhibit non stationary behaviour. The Augmented Dickey Fuller test was used to formally test for stationery in the series.

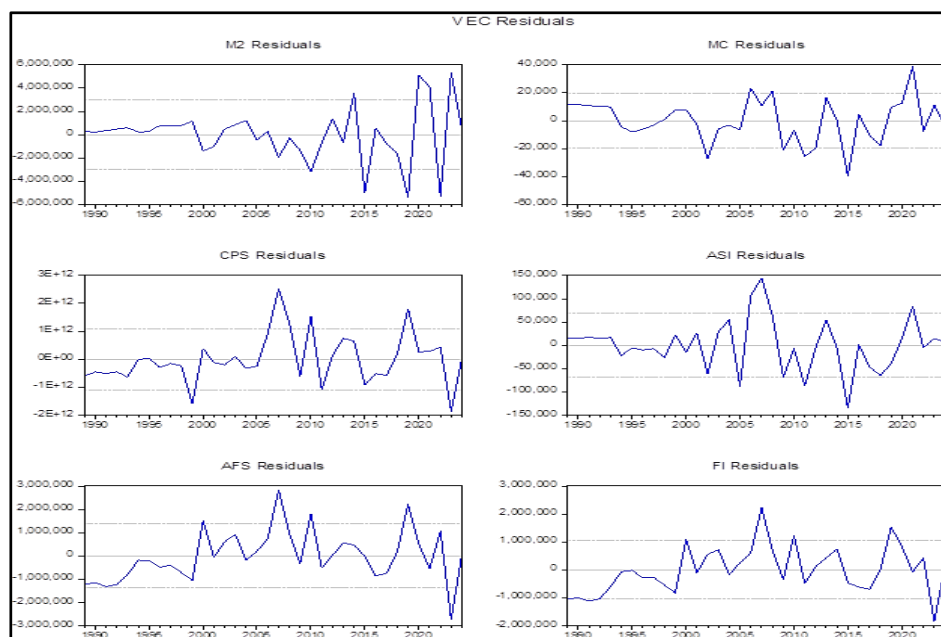


Figure 2: Graph of Log Data

The graph of figure 2 above shows the Log data. Stationary was attained by logging the data and this is established by the result of the Augmented Dickey-Fuller Test given the p-value below, which is statistically significant at 1%, 5% and 10% levels. The log was done to remove the trend component of the data. The observation now moves irregularly but returns to its mean value and having a constant variance.

B. Diagnostics Test

1. VAR Residual Serial Correlation LM Tests

The results of the VAR Residual Serial Correlation LM tests show that the null hypothesis cannot be rejected since the respective p-values are greater than the α -value = 0.05 significant level at lag one. This suggests that the VAR model has effectively captured the relationships between the variables and that there is no significant serial correlation in the residuals.

Table 2 VAR Residual Serial Correlation LM Tests

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	Df	Prob.	Rao F-stat	df	Pro b.
1	33.68375	36	0.5792	0.911685	(36, 55.5)	0.6107

Source: computed from E-View 10

B. VAR Residual Heteroskedasticity Test

The VAR Residual Heteroskedasticity Test results, indicate no significant evidence of heteroskedasticity within the residuals, supporting the assumption of constant variance. The joint test yields a Chi-square statistic of 271.9668 with 252 degrees of freedom and a high probability value of 0.1850, suggesting that the null hypothesis of homoskedastic residuals cannot be rejected. Furthermore, the individual component tests for each individual product ($\text{res1}*\text{res1}$, $\text{res2}*\text{res2}$, $\text{res3}*\text{res3}$, $\text{res4}*\text{res4}$, $\text{res5}*\text{res5}$ and $\text{res6}*\text{res6}$) display similarly high probability values (all above 0.05) across both the F-tests and Chi-square tests, confirming the absence of significant heteroskedasticity in each case. These results collectively affirm the presence of constant variance within the model.

C. Unit Root Test for Stationarity

Table 3: Augmented Dickey Fuller Unit Root Stationarity Results

Variables	ADF Statistics	Critical Value	P-Value		Decision	
			I(0)	I(1)	I(0)	I(1)
LM2	-5.656369	1%, 5%, 10%	0.8550	0.0002	FTR**	Reject*
LMC	-5.402633	1%, 5%, 10%	0.7455	0.0005	FTR**	Reject*
LCPS	-6.591789	1%, 5%, 10%	0.9738	0.0000	FTR**	Reject*
LASI	-5.153314	1%, 5%, 10%	0.6039	0.0010	FTR**	Reject*
LAFS	-5.720271	1%, 5%, 10%	0.7945	0.0002	FTR**	Reject*
LFI	-5.616118	1%, 5%, 10%	0.7538	0.0002	FTR**	Reject*

Source: computed from E-View 10

The Augmented Dickey-Fuller (ADF) results reveal that all variables are non-stationary at levels but become stationary after first differencing. This implies that the series are integrated of order one, I (1). The result justifies the use of counteraction analysis and a Vector Autoregressive (VAR) framework to examine the long-run and dynamic relationships among the variables.

Table 4: Phillips –Perron Unit Root Stationarity Results

Variables	PP Statistics	Critical Value	P-Value		Decision	
			I(0)	I(1)	I(0)	I(1)
LM2	-5.657231	1%, 5%, 10%	0.8550	0.0002	FTR**	Reject*
LMC	-4.641897	1%, 5%, 10%	0.8972	0.0036	FTR**	Reject*
LCPS	-0.592164	1%, 5%, 10%	0.9738	0.0002	FTR**	Reject*
LASI	-4.376953	1%, 5%, 10%	0.8177	0.0070	FTR**	Reject*
LAFS	-5.721613	1%, 5%, 10%	0.7921	0.0002	FTR**	Reject*
LFI	-5.614612	1%, 5%, 10%	0.7504	0.0002	FTR**	Reject*

Source: computed from E-View 10

The result of the Philip-Perron test in table 4 shows that, the six variables (M2, MC, CPS, ASI, AFS and FI) went through unit root test and all the variables were found to be non-stationary at levels but were found to be stationary after first difference. However, they were statistically significant at 1%. The result of the Philip-Perron test displays that the variables were stationary at first difference because the p-value for all the variables was less than 1% level of significant.

D. Cointegration Test

1. Johansen Cointegration Test

Table 5: Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)			Unrestricted Cointegration Rank Test (Maximum Eigenvalue)		
Hypothesized No. of CE(s)	0.05 Critical Value	Prob.**	Hypothesized No. of CE(s)	0.05 Critical Value	Prob.**
None *	95.75366	0.0000	None *	40.07757	0.0000
At most 1 *	69.81889	0.0300	At most 1	33.87687	0.1044
At most 2	47.85613	0.1749	At most 2	27.58434	0.3334
At most 3	29.79707	0.3372	At most 3	21.13162	0.6091
At most 4	15.49471	0.2846	At most 4	14.26460	0.3212
At most 5	3.841466	0.2447	At most 5	3.841466	0.2447

Source: computed from E-View 10

The Johansen cointegration test was conducted using both the Trace and Maximum Eigenvalue statistics. For the Trace test, the null hypothesis of no cointegration is rejected for "None" and "At most 1" (p-values < 0.05), but not rejected for higher ranks ("At most 2" through "At most 5"). For the Maximum Eigenvalue test, the null is rejected only for "None" (p-value < 0.05), but not for "At most 1" to "At most 5". Both tests therefore confirm the presence of cointegration among the variables.

2. Pairwise Granger Causality Test

Table 6 Pairwise Granger Causality Test

Null Hypothesis:	F-Statistic	Prob.	Decision	Remark
LCPS does not Granger Cause LM2	3.66806	0.0637	Reject H_0	Unidirectional causality
LM2 does not Granger Cause LCPS	0.69190	0.4112	Accept H_0	
LCPS does not Granger Cause LMC	11.7184	0.0016	Reject H_0	Unidirectional causality
LMC does not Granger Cause LCPS	0.00029	0.9865	Accept H_0	
LAFS does not Granger Cause LASI	5.99026	0.0197	Reject H_0	Unidirectional causality
LASI does not Granger Cause LAFS	1.18793	0.2834	Accept H_0	
LASI does not Granger Cause LCPS	0.27338	0.6045	Accept H_0	Unidirectional causality
LCPS does not Granger Cause LASI	4.57085	0.0398	Reject H_0	
LFI does not Granger Cause LASI	6.65110	0.0144	Reject H_0	Unidirectional causality
LASI does not Granger Cause LFI	0.89702	0.3503	Accept H_0	

Source: computed from E-View 10

According to Table 6, since the variables are counteracted, the pairwise Granger causality test shows six significant one-way (unidirectional) causal relationships. The money supply (LM2) in the private sector (LCPS) credit to Granger-, but not vice versa; the market capitalization (LMC) feedback-free Granger. Financial services (LAFS) Granger-causes all share index (LASI) and LCPS also Granger-causes LASI, but in both situations the reverse causality is not true. Finally, financial inclusion (LFI) Granger-causes LASI with no reverse causation. All the outcomes are statistically significant at the 1, 5 or 10 percent level and no two-way causality is observed.

E. VAR Model

Table 7: Model Specification Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-106.232	NA	2.46e-05	6.413280	6.679911	6.505321
1	101.8824	332.9837*	1.36e-09*	-3.421851*	-1.555434*	-2.777564*

Source: computed from E-View

Table 7 displays that the best lag length for the analysis is lag one, which is supported by all of the criteria (LR, FPE, AIC, SC, and HQ).

Table 8: VAR Result

Dependent Variable: LM2 Method: VAR			
Variable	Coefficient	Std. Error	t-Statistic
LM2(-1)	0.423582	0.23244	1.82235
LMC(-1)	0.717067	0.32457	2.20931
LCPS(-1)	-0.269669	0.13208	-2.04177
LASI(-1)	-0.562498	0.32792	-1.71538
LAFS(-1)	0.565038	0.98291	0.57486
LFI(-1)	-0.473441	0.97423	-0.48596
C	11.98674	6.15664	1.94696
R-squared		0.998380	
Adj. R-squared		0.997535	

Source: computed from E-View 10

The results of the VAR demonstrate that the market capitalization and access to financial services influence the money supply positively, which is why these factors are important in enhancing liquidity. Conversely, credit to the private sector, all share index, and financial inclusion show negative and non-significant effects, which signify weak financial intermediation, ineffective transmission in the stock market and a high level of currency

outside the formal system. An increase in LM2 of one-unit augments current LM2 by 42.36 implying monetary growth. An increase in LMC by one unit increases LM2 by 71.71 which indicates a decreasing capital market performance. One unit decline in LCPS lowers LM2 by 26.97, meaning that there is shortage of money supply. A decline of one unit in the LASI decreases LM2 by 56.25 which implies low growth in the stock market. The positive correlation between LAFS and LM2 is 56.50, which is led by the low interest rates and healthy banking. Lastly, a one-unit fall in LFI lowers LM2 by 47.34, which is an indication of fewer banking transactions.

V. CONCLUSION OF THE STUDY

This study examined the impact of financial deepening indicators on money supply in Nigeria using a VAR/VECM framework with annual data (1986–2024), addressing a key gap in the literature: most prior studies focused on economic growth or poverty reduction rather than directly on money supply, and few employed a multivariate dynamic model with multiple deepening indicators simultaneously. Few studies used a multivariate dynamic model with multiple deepening indicators at the same time. Concerning objective

- Market capitalization have a significant and positive impact on the money supply, in line with Okafor et al. (2021), Okpara et al. (2018), and Oyadeyi et al. (2022), but in contrast to Nwosa (2018). In objective
- The available financial services (demand deposits) also had a positive significant influence, which is consistent with Olusegun et al. (2021) and financial deepening theory. In objective
- Credit to the private sector had a negative and statistically non-significant impact on money supply, which supports Nkamnebe et al. (2023), Samuel-Hope et al. (2020), and Albert et al. (2021), who argue that there is a continued credit allocation inefficiency. On objective
- Cointegration tests indicated that all variables had a long-run equilibrium relationship, but the all share index and financial inclusion had negative and insignificant effects, which is contrary to Akintola et al. (2020) but in line with the recent evidence of poor stock market transmission and incomplete financial integration.

Generally, although financial deepening has enhanced some (market capitalization and financial service access) the overall effectiveness of financial deepening in promoting monetary expansion is weak, which supports previous results on mixed and weak transmission effects. The research therefore seals the gap with direct, multivariate, dynamic evidence of money supply and provides a recommendation of improved delivery of credit, efficiency in the capital market and additional financial sector reforms.

REFERENCES

- [1] Abili, I. D. (2020). Impact of financial deepening on socio-economic development in Nigeria. *Bullion*, 44(4), Article 3. <https://dc.cbn.gov.ng/bullion/vol44/iss4/3>
- [2] Adenikinju, A. (2009). Financial sector reforms and economic growth in Nigeria. *African Economic and Business Review*, 7(1), 52–67.
- [3] Adeniran, O. L., & Alabi, F. O. (2020). Financial deepening and economic growth in Nigeria: Empirical analysis. *Economic and Financial Review*, 58(2), 18–34.
- [4] Akinlo, A. E. (2012). Financial development and economic growth: The Nigerian experience. *Journal of Emerging Issues in Economics, Finance and Banking*, 1(3), 161–173.
- [5] Akintola, A. A., Ojo-Okoro, I., & Itodo, I. A. (2020). Financial sector development and economic growth in Nigeria: An empirical re-examination. *CBN Economic Review*, 58(3), 59–84.
- [6] Albert, S. M., Samson, A. A., Gbeminiyi, A. T., & Sennuga, S. O. (2021). Financial development and economic growth in Nigeria. *GPH-International Journal of Business Management*, 4(04), 21–39.
- [7] Central Bank of Nigeria (CBN). (2017). Statistical bulletin and annual report.
- [8] Central Bank of Nigeria. (2023). Statistical Bulletin (Vol. 33). <https://www.cbn.gov.ng/statistics/statbulletin.asp>
- [9] Columba, F. (2009). Narrow money and transaction technology: New disaggregated evidence. *Journal of Economics and Business*, 61(4), 312–325.
- [10] Danrimi, N. H., & Badawaire, A. B. (2025). Population, inflation, and economic growth dynamics in Nigeria: A VAR and machine learning hybrid approach. *International Journal of Innovative Mathematics, Statistics and Energy Policies* 13(2).
- [11] Emmanuel, I. A., & Vivian, A. O. (2022). Financial deepening and economic growth in Nigeria. *Lafia Journal of Economics and Management Sciences*, 7.
- [12] Goldsmith, R. (1969). *Financial structure and development*. Yale University Press.
- [13] Granger, C. W. J. (1986). Developments in the study of cointegrated economic variables. *Oxford Bulletin of Economics and Statistics*, 48, 213–228.
- [14] Gujarati, D. N., Porter, D. C., & Gunasekar, S. (2012). *Basic econometrics*. Tata McGraw-Hill Education.
- [15] Jimoh, I. A., Wafure, O. G., & El-Yaqub, A. B. (2026). Modeling financial deepening and macroeconomic performance in Nigeria: Using autoregressive distributed lag model. *International Journal of Innovative Finance and Economics Research*, 14(1), 334–347. <https://doi.org/10.5281/zenodo.18722865>
- [16] Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica*, 59, 1551–1580.
- [17] Jhingan, M. L. (2005). *Macroeconomic theory* (5th ed.). Vrinda Publications.
- [18] Keynes, J. M. (1936). *The general theory of employment, interest and money*. Macmillan.
- [19] King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics*, 108(3), 717–738.
- [20] Levine, R. (2005). Finance and growth: Theory and evidence. In *Handbook of Economic Growth* (Vol. 1, pp. 865–934).
- [21] McKinnon, R. (1973). *Money and capital in economic development*. Brookings Institution.
- [22] Nanna, O. J., & Dogo, M. (1998). Structural reform, monetary policy and financial deepening: The Nigerian experience. *Economic and Financial Review*, 1(2), 1–29.

- [23] Pek, J., Wong, O., & Wong, A. (2018). How to address non-normality: A taxonomy of approaches. *Review of Quantitative Methods for Psychology*, 14(3), 202–214.
- [24] Sims, C. A. (1980). Macroeconomics and reality. *Econometrica*, 48(1), 1–48.
- [25] Wafure, O. G., Nurudeen, A. (2010). Determinants of foreign direct investment in Nigeria: an empirical analysis. *Global Journal of Human social science* 10(1): 26-34
- [26] World Bank. (2022). Financial development overview. World Bank Publications.