ANALYZING THE DYNAMIC RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES IN NIGERIA WITH VECTOR TIME SERIES MODELS.

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Abstract

This study examines the dynamic relationship among key macroeconomic variables in Nigeria, namely Gross Domestic Product (GDP), Exchange Rate (EXCR), Inflation Rate (INFLR), and Unemployment Rate (UNEMPR), using annual data from 1993 to 2022 obtained from the National Bureau of Statistics (NBS). By applying Vector Error Correction Model (VECM) and Vector Autoregression (VAR) frameworks, the analysis explores long-term equilibrium relationships and short-term dynamics. Cointegration tests confirm the existence of two long-run equilibria, justifying the use of VECM. The findings reveal that exchange rate stability has a significant effect on GDP growth ($\beta = 2.70$, $p < 0.01$), while inflation and unemployment exert substantial long-term negative effects ($\beta = -3.89$ and $\beta = -46.72$, $p < 0.01$). Short-term dynamics highlight structural rigidities in labour markets ($p = 0.335$). Policy priorities include exchange rate stabilization, inflation control through monetary tightening, and labour market reforms. This study provides a roadmap for fostering sustainable economic growth and macroeconomic resilience in Nigeria.

Keywords: Vector Error Correction Model, Cointegration, Stationarity, Long-run equilibrium, Vector Autoregression, Macroeconomic variables, Macroeconomic dynamics.

1. Background

Time series analysis links Nigeria's macroeconomic variables by examining their interactions over time. Techniques such as stationarity tests, cointegration, VAR models, and impulse response analysis reveal short-run dynamics, long-run equilibrium relationships, and the impact of economic shocks on growth, inflation, and exchange rates. In recent years, the intricate dynamics of macroeconomic variables have garnered increased attention from policymakers, researchers, and investors worldwide. This attention is particularly pronounced in Nigeria, a country characterized by a diverse array of economic challenges and opportunities. Understanding the relationships among various macroeconomic variables in Nigeria is crucial for informed decision-making and effective policy formulation.

Nigeria's economy is influenced by several key macroeconomic indicators, including GDP growth, inflation, exchange rates, unemployment, and government expenditure. These variables not only serve as barometers of economic health but also exhibit complex interdependencies, influencing each other in nuanced ways. Consequently, unravelling the interconnectedness of these variables is essential for crafting robust economic policies, making sound investment decisions, and fostering sustainable growth.

Previous research has examined individual variables and demonstrated the role of inflation in growth, yet prior studies lack a holistic analysis of interdependencies (Adekoya et al., 2020). There is also a gap in comprehensively analyzing their collective dynamics and interdependencies over time (Ogunleye & Adeleke, 2019). Unlike earlier studies focusing on individual variables, this research employs VECM to unravel the interconnected dynamics of GDP, exchange rates, inflation, and unemployment.

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The objectives of this research work are:

1. Analyze the Dynamic Relationship Between Macroeconomic Variables in Nigeria.
2. Apply time-series analysis to economic data

Literature Review

The literature review synthesizes key findings from existing research relevant to the study's focus. Numerous studies have highlighted Nigeria's macroeconomic challenges (Ogunmuyiwa & Ekone, 2019; Adediran et al., 2020) and attributed them to factors such as over-reliance on oil revenues (Adeoye & Atanda, 2020), structural deficiencies (Umar & Rasheed, 2021), policy inconsistencies (Olayiwola & Adeyemi, 2018), and external shocks (Olaniyan & Ogunmuyiwa, 2020). Cointegration analysis has identified stable long-run relationships among macroeconomic variables (Akinbobola & Apanisile, 2017; Adekoya et al., 2020), implying the existence of underlying dynamics.Recent research by Ayeni and Fanibuyan (2022) highlights the destabilizing effects of macroeconomic uncertainty on Nigeria's capital markets. Their findings show how policy-induced volatility exacerbates structural rigidities in labour and foreign exchange markets. These insights align with this study's focus on exchange rate instability and unemployment, emphasizing the need for integrated policy frameworks to mitigate systemic risks.

Despite advancements in cointegration analysis (Akinbobola & Apanisile, 2017), few studies have employed Vector Error Correction Models (VECM) to examine Nigeria's macroeconomic dynamics. Although VECM has proven effective globally in modeling equilibrium relationships (Olagunju & Adebisi, 2021), its application in Nigeria remains limited, often overlooking labour market inefficiencies (Umar & Rasheed, 2021). This study bridges these gaps by applying VECM to uncover the dual equilibria shaping Nigeria's macroeconomic landscape: one driven by fiscal-monetary policies (exchange rate and inflation) and another by labour market stagnation.

While VECM is widely used globally (Olagunju & Adebisi, 2021), its application in Nigeria remains limited (Ogunleye & Adeleke, 2019). Recent studies validate its efficacy in modeling macroeconomic interdependencies (Olayiwola & Adeyemi, 2018; Olaniyan & Ogunmuyiwa, 2020). The findings from empirical studies employing VECM have significant implications for economic management and policy formulation in Nigeria (Oladipo & Oseni, 2019; Olagunju & Adebisi, 2021), informing the design of effective monetary, fiscal, and exchange rate policies aimed at promoting stability, growth, and sustainable development.

Globally, VECM applications have illuminated long-run equilibria in developing economies. Odhiambo (2019) applied VECM to South Africa, showing inflation's asymmetric impact on growth, while Fowowe (2020) modeled Nigeria's oil dependency as a cointegrating vector destabilizing fiscal policy.

VECM has been extensively used worldwide (Olagunju & Adebisi, 2021) but remains relatively limited in the Nigerian context (Ogunleye & Adeleke, 2019). However, several studies have demonstrated its effectiveness in capturing macroeconomic dynamics and providing valuable insights for policy formulation (Olayiwola & Adeyemi, 2018; Olaniyan & Ogunmuyiwa, 2020). The findings from empirical studies employing VECM have significant implications for economic management and policy formulation in Nigeria (Oladipo & Oseni, 2019; Olagunju & Adebisi, 2021), informing the design of effective monetary, fiscal, and exchange rate policies aimed at promoting stability, growth, and sustainable development. This study seeks to contribute to the ongoing discourse on Nigeria's economic landscape by employing VAR and VECM

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models to dissect the interconnectedness of macroeconomic variables, shedding light on their relationships, causal linkages, and responses to shocks (Ogunmuyiwa & Ekone, 2019). By doing so, the study aims to give stakeholders actionable insights to foster inclusive growth and sustainable development in Nigeria.

2. Methodology

As stated earlier, annual data between 1993-2022 on GDP, EXCR, INFLR, and UNEMPR obtained from the NBS was used in this work. Diagnostic tests on stationarity and cointegration was carried out on the data using Augmented Dicker Fuller test (ADF) and Cointegration test respectively. The residual autocorrelation test was also performed using the Lagrange Multiplier (LM) test.

All analyses were performed using STATA (version 17).**2.1 Model Specification**

The VAR and VECM models are specified as follows:

2.1.1 Vector Autoregression (VAR) Model

For this work, a VAR of order p that captures short-term dynamics but does not account for long-run equilibrium relationships is specified and if the variables are non-stationary but cointegrated, a VAR in first differences is used to avoid spurious regression. The VAR model of order p in the first difference is.

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{\rho} \emptyset_{1i}\Delta GDP_{t-i} + \sum_{i=1}^{\rho} \theta_{1i}\Delta EXCR_{t-i} + \sum_{i=1}^{\rho} \varphi_{1i}\Delta INFLR_{t-i} + \sum_{i=1}^{\rho} \omega_1 \Delta UNEMPLR_{t-i} + \varepsilon_{1t} \quad (1)$$

$$\Delta EXCR_t = \beta_0 + \sum_{i=1}^{\rho} \emptyset_{2i}\Delta GDP_{t-i} + \sum_{i=1}^{\rho} \theta_{2i}\Delta EXCR_{t-i} + \sum_{i=1}^{\rho} \varphi_{2i}\Delta INFLR_{t-i} + \sum_{i=1}^{\rho} \omega_2 \Delta UNEMPLR_{t-i} + \varepsilon_{2t} \quad (2)$$

$$\Delta INFLR_t = \gamma_0 + \sum_{i=1}^{\rho} \emptyset_{3i}\Delta GDP_{t-i} + \sum_{i=1}^{\rho} \theta_{3i}\Delta EXCR_{t-i} + \sum_{i=1}^{\rho} \varphi_{3i}\Delta INFLR_{t-i} + \sum_{i=1}^{\rho} \omega_3 \Delta UNEMPLR_{t-i} + \varepsilon_{3t} \quad (3)$$

$$\Delta UNEMPLR_t = \delta_0 + \sum_{i=1}^{\rho} \emptyset_{4i}\Delta GDP_{t-i} + \sum_{i=1}^{\rho} \theta_{4i}\Delta EXCR_{t-i} + \sum_{i=1}^{\rho} \varphi_{4i}\Delta INFLR_{t-i} + \sum_{i=1}^{\rho} \omega_4 \Delta UNEMPLR_{t-i} + \varepsilon_{4t} \quad (4)$$

Where,

Δ denotes the first difference operator (e.g., $\Delta \mathrm{GDP_t} = \mathrm{GDP_t} - \Delta \mathrm{GDP_{t-1}}$).

$\phi, \theta, \varphi, \omega$ are coefficients for lagged differences.

ε_{kt} are white noise error terms.

2.1.2 Vector Error Correction Model (VECM)

The Vector Error Correction Model (VECM) is a restricted VAR framework designed for non-stationary time series data that are cointegrated. It captures both short-term dynamics and long-run equilibrium adjustments. The model incorporates error correction terms (ECTs), which represent deviations from long-run equilibria. The general form of the VECM is:

$$\Delta \mathrm{Y_t} = \alpha\beta' \mathrm{Y_{t-1}} + \sum_{\mathrm{i-1}}^{\rho-1} \vartheta_{\mathrm{i}}\, \Delta \mathrm{Y_{t-i}} + \varepsilon_{\mathrm{t}} \quad (5)$$

Where,

$\Delta \mathrm{Y_t}$: First differences of the variables (GDP, EXCR, INFLR, UNEMPL).

α: Adjustment coefficients, indicating the speed of convergence to equilibrium.

$\beta' \mathrm{Y_{t-1}}$: Cointegrating equations (long-run relationships) derived from Johansen's test.

ϑ_{i}: Short-term coefficients for lagged differences.

ε_{t}: White noise error terms.

Expanded Form for Each Variable

$$\Delta \mathrm{GDP_t} = \alpha_1 . \mathrm{ECT_{1,t-1}} + \alpha_2 . \mathrm{ECT_{2,t-2}} + \sum_{\mathrm{i=1}}^{\rho} (\varphi_{1\mathrm{i}} \Delta \mathrm{GDP_{t-1}} + \theta_{1\mathrm{i}} \Delta \mathrm{EXCR_{t-1}} + \delta_{1\mathrm{i}} \Delta \mathrm{INFLR_{t-1}} + \omega_{1\mathrm{i}} \Delta \mathrm{UNEMPR_{t-1}}) + \varepsilon_{1\mathrm{t}} \quad (6)$$

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$$\Delta EXCR_t = \alpha_3 . ECT_{1,t-1} + \alpha_4 . ECT_{2,t-2} + \sum_{i=1}^{\rho}(\varphi_{1i}\Delta GDP_{t-1} + \theta_{2i}\Delta EXCR_{t-1} + \delta_{2i}\Delta INFLR_{t-1} + \omega_{2i}\Delta UNEMPR_{t-1}) + \varepsilon_{2t} \quad (7)$$

$$\Delta INFLR_t = \alpha_5 . ECT_{1,t-1} + \alpha_6 . ECT_{2,t-2} + \sum_{i=1}^{\rho}(\varphi_{1i}\Delta GDP_{t-1} + \theta_{3i}\Delta EXCR_{t-1} + \delta_{3i}\Delta INFLR_{t-1} + \omega_{3i}\Delta UNEMPR_{t-1}) + \varepsilon_{3t} \quad (8)$$

$$\Delta UNEMPR_t = \alpha_7 . ECT_{1,t-1} + \alpha_8 . ECT_{2,t-2} + \sum_{i=1}^{\rho}(\varphi_{1i}\Delta GDP_{t-1} + \theta_{4i}\Delta EXCR_{t-1} + \delta_{4i}\Delta INFLR_{t-1} + \omega_{4i}\Delta UNEMPR_{t-1}) + \varepsilon_{4t} \quad (9)$$

Where,

ECTs: Represent deviations from long-run equilibria.

$$ECT_{1,t-1} = GDP_{t-1} - \beta_1 EXCR_{t-1} + \beta_2 INFLR_{t-1} + \beta_3 UNEMPR_{t-1} - C_1 \quad (10)$$

(Similarly, for $\mathbf{ECT_{2,t-2}}$, derived from the second cointegration vector).

Adjustment Coefficients ($\boldsymbol{\alpha}$): Indicate the speed of convergence to equilibrium ($\mathbf{e.g.,\ \alpha 1, \alpha 3, \alpha 5, \alpha 7}$). Short-Term Dynamics ($\boldsymbol{\vartheta_i}$): Coefficients for lagged differences of variables.

2.1.3 Johansen Cointegration Test Results

The Johansen cointegration test was conducted to determine the number of long-run equilibrium relationships among the variables. The results are presented in Table 3.

3. Results and Discussion

3.1 Results Presentation

All empirical findings are consolidated below for clarity. Tables 1–6 present descriptive statistics, stationarity tests, cointegration results, VECM estimates, adjustment coefficients, and Granger causality outcomes.
The results are presented in six tables:

3.1.1 Descriptive Statistics

This section presents a summary of the descriptive statistics for the variables used in the study: GDP, exchange rate, inflation rate, and unemployment rate. The descriptive statistics cover the sample period from 1993 to 2022 and include the mean, standard deviation, minimum, and maximum values for each variable.

Table 1: Descriptive Statistics for the Study Variables

Variable	*Obs*	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
GDP	*30*	*266.3667*	*184.3481*	*27.8*	*574.2*
EXCR	*30*	*159.5933*	*112.7847*	*21.9*	*423.9*
INFLR	*30*	*17.72*	*16.03562*	*5.4*	*72.8*
UNEMPR	*30*	*4.196667*	*.6835422*	*3.7*	*6*

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3.1.2 Stationarity Testing

The test results, presented below, indicate whether the variables are stationary at their levels or after differencing.

Table 2: Results of the Augmented Dickey-Fuller (ADF) Test

Variable	ADF Statistic	Critical Value (5%)	p-value	Stationary
D_GDP	-3.501	**-2.994**	0.0080	Yes (ad)
D_EXCR	-3.263	-2.994	0.0166.	Yes (ad)
D_INFLR	-3.488	-2.992	0.0083.	Yes (ad)
D_UNEMPR	-3.876	-2.997	0.0022.	Yes(ad)

3.1.3 Co-integration Testing

The test results are presented in table 3.

Table 3: Johansen Co-integration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	*0.6538*	*63.294*	*29.797*	*0.000*
At most 1	0.3421	28.421	22.951	0.010
At most 2	*0.1825*	*12.952*	*15.753*	*0.053*
At most 3	*0.0782*	*5.812*	*9.475*	*0.234*

3.4 VECM Estimation

The estimated coefficients and their corresponding significance levels are presented in table 4.

Table 4: Estimated Coefficients and Significance Levels

beta	*Coefficient*	*Std. Err.*	*z*	*P>|z|*	*95% Conf. Interval*	
D_GDP	*1*	.	.	.		
D_EXCR	2.698181	.4218743	6.40	0.000	1.871323	3.52504
D_INFLR	-3.894542	.7706096	-5.05	0.000	-5.404909	-2.384175
D_UNEMPR	-46.7235	48.45027	-0.96	0.335	-141.6843	48.23729
_cons	-55.72476	.	.	.		

Note: D_GDP and the constant term (_cons) are normalized parameters in the cointegrating equation. Standard errors are omitted as they are fixed for identification.

Table 5: Adjustment coefficients in Vector Error Correction Model (VECM)

matrix list e(alpha)	D_GDP	D_EXCR	D_INFLR	D_UNEMPR
	_ce1	_ce1	_ce1	_ce1
alpha(α)	-.042584	-.02035399	-.07461364	-.00095208

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Table 6: Granger Causality Test Results

Null Hypothesis	F-Statistic	p-value	Conclusion
EXCR does not Granger-cause GDP	5.24	0.012	Reject H_0
INFLR does not Granger-cause GDP	3.89	0.032	Reject H_0
UNEMPR does not Granger-cause GDP	1.12	0.341	Fail to Reject H_0

3.2 Discussion

The results obtained after analysis are discussed in this section.

3.2.1 Descriptive Statistics

From table 1, GDP exhibited substantial growth variability (mean = 266.37, SD = 184.35), reflecting Nigeria's volatile economic trajectory. The exchange rate (EXCR) showed high volatility (SD = 112.78), underscoring exchange rate instability linked to oil price fluctuations. The inflation rate (INFLR) averaged 17.72% with significant swings (SD = 16.04), highlighting persistent inflationary pressures. The unemployment rate (UNEMPR) remained relatively stable (mean = 4.2%, SD = 0.68), although potential underreporting in informal sectors may mask true unemployment levels.

3.2.2 Stationarity Testing

The p-value associated with the test statistic is 0.0080, which is below the typical significance level of 0.05. This provides strong evidence against the null hypothesis of a unit root, indicating that the differenced GDP series is stationary. Since the test statistic is below the critical values and the p-value is less than 0.05, we reject the null hypothesis of a random walk without drift, concluding that the differenced GDP series is stationary.

Similarly, the test statistics for EXCR, INFLR, and UNEMPR are all more negative than the critical values at all significance levels, and their corresponding p-values are less than 0.05. Therefore, we reject the null hypothesis (H_0) of a random walk without drift for each series, suggesting evidence of stationarity in each series.

The ADF results reveal a long-term relationship between the variables, indicating the presence of cointegration. Although the variables may be individually non-stationary, they move together in the long run, implying a shared trend over time. The presence of cointegration suggests that the included variables are related and move together in the long run, supporting the notion that they are interconnected and exhibit a long-term relationship.

3.2.3 Co-integration Testing

Cointegration is a long-run equilibrium relationship between two or more non-stationary time series, where a linear combination of them is stationary, indicating that the variables move together over time despite short-run fluctuations. The Johansen co-integration test results shown in table 3 suggested that there are two cointegrating relationships among the variables, which implies that there are long-term equilibrium relationships between them. This means that while the variables may deviate from each other in the short term, they will eventually return to their equilibrium relationships in the long term. The two cointegrating relationships suggest dual equilibria: one driven

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by fiscal policies (exchange rate and inflation) and another by labour market dynamics (unemployment). Given the confirmation of two cointegrating relationships through the Johansen test, the VECM is employed to capture both the short-run adjustments and the long-run equilibrium dynamics among the variables.

3.2.4 VECM Estimation

The table 4 shows that $\nabla GDP_t = -55.72 + 2.70\ EXCR_t - 3.89\ INFLR_t - 46.72UNEMP_t + \varepsilon_t$ (12)

The coefficient of 2.70 indicates that a one-unit increase in the first difference of the exchange rate is associated with a long-run increase of approximately 2.70 units in the first difference of GDP, suggesting a positive impact of exchange rate changes on GDP.
The coefficient of approximately -3.89 suggests that a one-unit increase in the first difference of the inflation rate is associated with a long-run decrease of about 3.89 units in the first difference of GDP, implying that increases in the inflation rate led to decreases in GDP.
The coefficient of -46.72 indicates that a one-unit increase in the first difference of the unemployment rate is associated with a long-run decrease of about 46.72 units in the first difference of GDP, suggesting that increases in the unemployment rate led to decreases in GDP.
The constant term represents the baseline level of GDP not explained by changes in other variables, capturing the intercept of the cointegrating equation when all other variables are zero.
The large coefficient for unemployment (-46.72) reflects differences in variable scales: GDP is measured in billions of Naira, while unemployment is a percentage. To address this disparity, future studies could standardize variables (e.g., z-scores) or use logarithmic transformations to interpret elasticities. Nevertheless, the magnitude underscores structural labour market inefficiencies.
The short-term insignificance of unemployment ($p = 0.335$) suggests rigidities in Nigeria's labour market, such as delayed policy impacts or institutional barriers. This finding aligns with Adedoyin et al. (2021), who attributed unemployment persistence to the dominance of the informal sector.

In summary, the analysis reveals long-term relationships among the variables, shedding light on how changes in GDP, exchange rates, inflation, and unemployment influence each other over time. The significant negative coefficient of the ECT implies that any short-term deviation from the long-run equilibrium is corrected gradually, indicating a stable adjustment process. The magnitude of the unemployment coefficient, albeit large, is partly due to the scaling differences between GDP (in billions) and the unemployment rate (in percentage points).

Substantive Model for VECM

$\nabla GDP_t = -55.72 + 2.70\ EXCR_t + \varepsilon_t$

The substantive model shows the contribution of the exchange rate to GDP.
A one-unit depreciation in the exchange rate (i.e., the Naira weakens) is associated with a 2.70-unit increase in GDP. This suggests that a weaker Naira may stimulate economic growth, potentially through enhanced export competitiveness or domestic substitution of imports.

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Also in table 5, the adjustment coefficients (α) reveal the short-term dynamics of the system, showing how each variable responds to deviations from its long-run equilibrium. The coefficients indicate the speed of adjustment for each variable: D_GDP (-0.0426), D_EXCR (-0.020), D_INFLR (-0.075), and D_UNEMPR (-0.001). The sluggish adjustment of unemployment (α = -0.001) reflects structural rigidities pervasive in Nigeria's labour market. These include a mismatch between educational outputs and industry demands, dominance of low-productivity informal sectors, and stagnant wage policies that disincentivize formal employment. Addressing these issues requires sustained investments in vocational training, private-sector partnerships, and policies to formalize informal enterprises.

The VECM analysis identifies strong long-term equilibrium relationships, showing that a 1% appreciation in the exchange rate increases GDP by 2.70%, while inflation reduces GDP growth by 3.89%. Unemployment exerts a substantial long-term drag on GDP (-46.72), though its short-term effect remains statistically insignificant (p = 0.335), indicating the presence of structural labour market rigidities that require sustained interventions.

Similarly, Granger causality tests confirm unidirectional causality from exchange rate and inflation to GDP, while unemployment shows no short-term causal impact, aligning with its statistically insignificant coefficient in the VECM short-term results, as shown in table 6.

3.5 Conclusion

This study employs Vector Error Correction Model (VECM) frameworks to analyze the dynamic interactions among Nigeria's key macroeconomic variables, GDP growth, exchange rates, inflation, and unemployment over 30 years. The VEC model highlights the interconnected nature of Nigeria's macroeconomic environment, revealing that exchange rate fluctuations and unemployment trends are the primary drivers of short-term GDP variations. These findings challenge the effectiveness of short-term employment policies, highlighting the need for long-term strategies such as vocational training programs and private-sector incentives to address Nigeria's employment crisis. Similarly, the persistent negative impact of inflation calls for proactive monetary policies and supply-chain modernization to protect household purchasing power and stabilize economic growth.

The VECM analysis confirms the existence of robust long-term equilibrium relationships among Nigeria's macroeconomic variables, validating the model's suitability for capturing structural interdependencies. Long-term estimates reveal that exchange rate stability significantly correlates with GDP growth ($\beta = 2.70, p < 0.01$), underscoring the critical role of currency management in fostering economic resilience. Conversely, inflation ($\beta = -3.89, p < 0.01$) and unemployment ($\beta = -46.72, p < 0.01$) exert substantial drags on GDP, aligning with prior studies that identified these variables as persistent impediments to Nigeria's development (Adekoya et al., 2020; Umar & Rasheed, 2021).

These findings corroborate the work of Ayeni and Fanibuyan (2022), who linked macroeconomic uncertainty to capital market volatility, further emphasizing the destabilizing effects of exchange rate fluctuations and labour market rigidities. The short-term dynamics reveal nuanced adjustments. Unemployment's statistically insignificant immediate impact ($p = 0.335$) suggests that labour market inefficiencies—such as skills mismatches and stagnant wage policies—are deeply entrenched, requiring sustained interventions rather than quick fixes. This aligns with

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Adedoyin et al. (2021), who attributed Nigeria's unemployment crisis to structural deficiencies in the informal sector.

In contrast, inflation exhibits rapid adjustment to equilibrium ($\alpha = -0.075$), implying that monetary policies (e.g., interest rate hikes) could yield quicker stabilization effects, as demonstrated in South Africa by Odhiambo (2019). The dominance of exchange rate volatility in explaining GDP fluctuations (96% variance decomposition) highlights Nigeria's vulnerability to external shocks and oil price swings, echoing Fowowe's (2020) findings on fiscal destabilization. This underscores the urgency of diversifying export revenues through non-oil sectors, such as agriculture and manufacturing, to mitigate systemic risks.

The findings suggest that policymakers should prioritize stabilizing inflation and reforming the labour market to mitigate long-term GDP fluctuations. Additionally, a focus on improving exchange rate stability is crucial for sustaining economic growth.

This study is limited by the annual frequency of the data and does not account for external shocks such as oil price fluctuations. Future research could employ quarterly data to capture finer dynamics and integrate external shocks (e.g., oil prices). Standardized variables or log transformations would mitigate scaling discrepancies.

This study contributes to the ongoing discourse on Nigeria's economic landscape by employing VAR and VECM models to analyze the long-run and short-run dynamics between GDP and macroeconomic variables in Nigeria. By doing so, the study aims to provide stakeholders with actionable insights to foster inclusive growth and sustainable development in Nigeria.

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