Capital Market Dynamics, Macroeconomic Instability, and Economic Growth in Nigeria: A VECM–Quantile-On-Quantile Regression Approach

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DOI: https://doi.org/10.47772/IJRISS.2026.100600983

Received: 20 June 2026; Accepted: 26 June 2026; Published: 09 July 2026

ABSTRACT

This study investigates the heterogeneous nexus among capital market development, macroeconomic instability, and economic growth in Nigeria over 1985–2022. Departing from prevailing ARDL-based frameworks, the study adopts a two-stage methodology: the Johansen–Juselius Multivariate Cointegration and Vector Error Correction Model (VECM) to identify long-run equilibrium dynamics, and the Quantile-on-Quantile Regression (QQR) framework (Sim and Zhou, 2015) to map the full distributional dependence between capital market variables, macroeconomic indicators, and economic growth. Using quarterly data on Market Capitalization (MCP), All Share Index (ASI), Number of Shares Traded (NOS), Inflation (INF), Exchange Rate (EXC), Fiscal Deficit (FD), and Government Debt (GD), results confirm four cointegrating vectors and a speed of adjustment of approximately 8.9 percent per quarter. QQR analysis reveals that the positive growth effect of market capitalization intensifies only when both variables are in upper quantile states, that inflation is most destructive during low-growth regimes, and that government debt has a non-monotonic, threshold-dependent relationship with growth. These findings carry significant implications for heterogeneity-aware capital market and macroeconomic policy in Nigeria.

Keywords: Capital Market; Economic Growth; VECM; Quantile-on-Quantile Regression; Macroeconomic Instability; Nigeria

CHAPTER ONE: INTRODUCTION

Background

Financial market development and economic growth share a well-documented theoretical and empirical relationship, tracing back to Schumpeter (1911) and operationalised in modern growth theory by Levine (1997) and Beck and Levine (2004). For Nigeria—sub-Saharan Africa's largest economy—the capital market constitutes a critical institutional mechanism for mobilising long-term savings, allocating risk, and channelling investment toward productive activities. Since the establishment of the Nigerian Stock Exchange in 1960 and the successive reform waves of the 1980s through 2020s, the Nigerian capital market has grown substantially in nominal terms yet remains characterised by shallow depth, narrow breadth, persistent illiquidity, and acute vulnerability to macroeconomic shocks (Ariyo and Adelegan, 2005; Umar, 2022).

The macroeconomic environment compounds this challenge. Nigeria's inflation averaged over sixteen percent per annum across the study period; the Naira depreciated from approximately ₦2/US$ to over ₦900/US$; and fiscal deficits and government debt have expanded markedly since 2015 (CBN, 2022). These concurrent pressures motivate a rigorous empirical examination of whether capital market development can translate into sustained economic growth under chronic macroeconomic instability, and more importantly, under what distributional conditions such translation is most effective.

A critical limitation of the existing Nigerian empirical literature is its near-exclusive reliance on mean-based estimators—OLS, GMM, and especially ARDL bounds testing—which estimate average relationships and

thereby obscure potentially important heterogeneities across the distribution of economic growth and capital market performance. The Quantile-on-Quantile Regression (QQR) framework resolves this by capturing the effect of the τ-th quantile of any independent variable on the θ-th quantile of GDP growth, producing a comprehensive (θ,τ) coefficient surface. No existing study has applied QQR to the capital market–growth nexus in Nigeria; this study fills that gap.

Problem Statement

Despite decades of reform—including the Structural Adjustment Programme (1986), NSE recapitalisation (2005), and the SEC Capital Market Master Plan (2015–2025)—Nigeria's capital market has not consistently translated growth in market capitalisation into improvements in real output. Market capitalisation fell from a peak of ₦13.5 trillion (2008) to below ₦4.5 trillion by 2010, and the economy recorded contractions in 2016 and 2020. Macroeconomic instability, characterised by high inflation, exchange rate volatility, fiscal deficits, and rising public debt, is widely identified as a binding constraint on capital market deepening and on the productive deployment of long-term capital. Yet the nature of this constraint is state-contingent: the relationship between capital market variables and economic growth almost certainly differs depending on whether the economy is in a recession, moderate expansion, or boom phase. Conventional mean-based methods cannot detect this heterogeneity. This study addresses that methodological and empirical gap.

Objectives

1. Establish the long-run cointegration relationship among capital market, macroeconomic, and growth variables using the Johansen–Juselius framework.
2. Model short-run adjustment dynamics and speed of equilibrium correction via the VECM.
3. Map the quantile-specific effects of MCP, ASI, NOS, INF, EXC, FD, and GD on economic growth across the joint distribution of both variables using QQR.
4. Derive state-contingent policy implications for capital market and macroeconomic governance in Nigeria.

Significance

Theoretically, the study advances the endogenous growth framework by demonstrating that the finance–growth nexus is fundamentally distributional, not uniform. Methodologically, the VECM + QQR combination represents a significant advance over ARDL-based approaches. For policymakers—the SEC, CBN, and Federal Ministry of Finance—the findings enable the design of heterogeneity-aware, state-contingent policies calibrated to prevailing economic conditions rather than average-performance assumptions.

CHAPTER TWO: LITERATURE REVIEW

Theoretical Frameworks

The study is anchored in four theoretical pillars. The Endogenous Growth Model (Lucas, 1988; Romer, 1986, 1990) posits that growth is self-sustaining and internally generated through human capital accumulation, innovation, and institutional quality, with capital markets serving as enabling infrastructure for the allocation of growth-promoting investment. The Arbitrage Pricing Theory (Ross, 1976) establishes that macroeconomic factors are systematic risk determinants of asset returns, providing the theoretical basis for the two-way link between macroeconomic instability and capital market performance. The Efficient Market Hypothesis (Fama, 1970) underscores the conditions under which capital market prices accurately reflect productive capacity, while the Capital Asset Pricing Model (Sharpe, 1964; Lintner, 1965) links macroeconomic risk premiums to the cost of equity capital and therefore to the volume of investment-financed growth. Patrick's (1966) supply-leading and demand-following hypotheses frame the direction-of-causality question that the VECM Granger causality analysis addresses.

Empirical Evidence

At the global level, Levine and Zervos (1998) demonstrated that stock market liquidity and bank development are jointly and robustly associated with future economic growth in 47 countries. Beck and Levine (2004)

confirmed independent positive effects of both financial intermediaries and equity markets on long-run growth using dynamic panel methods. Azimi (2022) found nonlinear, asymmetric effects of capital market depth on growth in China, while Antwi, Issah and Kpodo (2021) confirmed a positive long-run nexus for Ghana.

Within Nigeria, Ewah, Esang and Bassey (2009) found that capital market potential for growth promotion had not materialised owing to illiquidity and misappropriation of funds. Donwa and Odia (2010) found no significant impact of capital market indices on GDP using OLS. Conversely, Araoye, Ajayi and Aruwaji (2018), Anthony-Orji and Ogbuabor (2018), and Bello, Folorunsho and Alabi (2022) identified positive long-run relationships. The divergence in findings reflects both methodological variation and the genuine state-contingency of the relationship—a problem the QQR approach directly addresses.

On macroeconomic variables, Asaolu and Ogunmuyiwa (2011) found that money supply, exchange rate, and inflation jointly drive Nigerian stock market performance. Adaramola and Dada (2020) confirmed significant negative effects of inflation on growth, while Bittencourt (2011) documented inflation–financial development trade-offs. The absence of QQR studies on this topic for Nigeria constitutes the central literature gap.

CHAPTER THREE: RESEARCH METHODOLOGY

Data and Variables

Quarterly time-series data spanning 1985Q1 to 2022Q4 (152 observations) are sourced from the CBN Statistical Bulletin, NSE Annual Reports, National Bureau of Statistics, and World Bank WDI. The dependent variable is the logarithm of Real GDP (LRGDP). Capital market proxies are Market Capitalization (MCP), All Share Index (ASI), and Number of Shares Traded (NOS). Macroeconomic indicators are Inflation Rate (INF), Exchange Rate (EXC), Fiscal Deficit/GDP (FD), and Government Debt/GDP (GD).

Construction of the Quarterly GDP Series

The National Bureau of Statistics (NBS) commenced official publication of quarterly GDP estimates in 2010. For the pre-2010 period (1985Q1–2009Q4), quarterly GDP is interpolated from annual NBS and CBN series using the Chow-Lin (1971) maximum-likelihood procedure with related indicator variables. Specifically, quarterly data on private credit extended by deposit money banks (sourced from the CBN Statistical Bulletin), government capital expenditure, and the NSE All Share Index are employed as high-frequency indicator variables for the disaggregation, given their well-established co-movement with real output at the quarterly frequency. The Chow-Lin procedure distributes annual control totals to quarters in a manner that minimises the generalised least-squares criterion and preserves the annual benchmarks, producing a smooth and internally consistent quarterly series. Alternative interpolation methods—including the quadratic match-sum (QMS) procedure of Denton (1971) and the Boot-Feibes-Lisman (1967) method—were also employed, and the key VECM and QQR results reported in Chapter Four are robust to these alternatives. As a further robustness check, all estimations are replicated using the restricted post-2010 sample (2010Q1–2022Q4, 52 observations) for which official quarterly GDP data are available. The main qualitative findings—four cointegrating vectors, positive long-run capital market coefficients, negative macroeconomic instability coefficients, and the distributional asymmetries documented in the QQR analysis—are confirmed in the restricted sample, indicating that the results are not driven by the constructed pre-2010 observations. Full sensitivity analysis results, including coefficient tables for alternative interpolation methods and the restricted sample, are available from the authors upon request.

Johansen–Juselius Cointegration and VECM

Given that all variables are I(1)—confirmed by ADF, PP, and KPSS tests—the Johansen (1988) and Johansen and Juselius (1990) maximum-likelihood cointegration framework is applied. The multivariate system is specified as:

$$\Delta Xt = \mu + \Pi Xt\text{-}1 + \Sigma_{i=1}^{p-1} \Gamma_i \Delta Xt\text{-}i + \varepsilon t \quad (1)$$

where $\Pi = \alpha\beta'$ encodes the speed of adjustment (α) and the cointegrating vectors (β). The rank r of Π, determined by trace and maximum-eigenvalue statistics, identifies the number of long-run equilibrium relationships. The

VECM for LRGDP then takes the form:

$$\Delta LRGDPt = \alpha + \Sigma\beta_i \Delta Xt\text{-}i + \delta \cdot ECTt\text{-}1 + \varepsilon t \quad (2)$$

where ECTt-1 is the lagged error correction term and δ is the speed-of-adjustment coefficient (expected negative and significant). This approach is preferred over ARDL because it does not require pre-specified bounds, models all endogenous relationships simultaneously, and directly recovers the number of cointegrating vectors without assuming a single long-run equation.

Lag length selection follows the standard information criterion approach. The VAR system is estimated for lag orders p = 1 through p = 6, yielding the following information criterion values: at p = 1, AIC = –14.23 and SBC = –13.87; at p = 2, AIC = –15.61 and SBC = –14.89; at p = 3, AIC = –15.74 and SBC = –14.67 (selected); at p = 4, AIC = –15.68 and SBC = –14.21; at p = 5, AIC = –15.52 and SBC = –13.72; and at p = 6, AIC = –15.41 and SBC = –13.28. Lag order p = 3 is selected as it minimises the AIC while the SBC signals parsimony concerns beyond p = 3, and residual diagnostic tests (LM autocorrelation test) confirm absence of serial correlation at this lag length. The Johansen cointegration test is implemented with a linear deterministic trend in the data and an intercept in the cointegrating equation (Case 3 of Johansen, 1995), which is appropriate given that the log-level GDP series exhibits a clear upward trend over the sample period. The corresponding asymptotic critical values are those tabulated by Osterwald-Lenum (1992) and Johansen (1995) for this specification. The speed-of-adjustment coefficient δ = –0.0891 reported in Table 2 refers specifically to the GDP (LRGDP) equation of the VECM; the adjustment coefficients for the remaining seven equations in the system are available from the authors upon request.

Quantile-on-Quantile Regression (QQR)

The QQR framework of Sim and Zhou (2015) estimates the slope coefficient $\beta_1(\theta,\tau)$ defined by:

$$Q\theta(LRGDPt \mid Xt(\tau)) = \beta_0(\theta,\tau) + \beta_1(\theta,\tau) \cdot Xt(\tau) + \varepsilon t \quad (3)$$

where $Xt(\tau)$ is the τ-th quantile of the explanatory variable. $\beta_1(\theta,\tau)$ captures how the τ-th quantile of Xt affects the θ-th quantile of LRGDP, producing a full (θ,τ) coefficient surface. Estimation uses a local linear regression minimising a kernel-weighted quantile loss function with Gaussian kernel and Silverman (1986) bandwidth. This dual-quantile mapping reveals heterogeneities invisible to both standard quantile regression (which ignores the distribution of Xt) and mean-based methods. Standard errors for the $\beta_1(\theta,\tau)$ estimates are computed using a pairs bootstrap procedure with 1,000 replications. At each bootstrap iteration, the full sample is resampled with replacement and the QQR estimator is applied across all (θ,τ) grid points. Bootstrap standard errors are preferred over analytical alternatives given the complexity of the local linear QQR estimator, the kernel-weighting structure, and the need to account for the joint dependence across quantile grid points. Statistical significance is assessed at conventional levels (1%, 5%, and 10%) using the bootstrap standard errors, and the resulting coefficient surfaces are reported in Table 3a through Table 3g with standard errors in parentheses.

CHAPTER FOUR: RESULTS AND DISCUSSION

Descriptive Statistics and Unit Root Tests

All Jarque-Bera statistics are significant at the 1% level, confirming non-normal distributions with excess kurtosis and skewness across all variables. This validates the use of quantile-based methods. ADF, PP, and KPSS tests unanimously confirm that all series are I(1)—non-stationary in levels but stationary after first differencing.

Structural Break and Stability Tests

To validate the stability of the I(1) classification and the cointegrating relationships against the possibility of regime changes—particularly the 2015 fiscal crisis and the 2016 recession—supplementary structural break tests are conducted. The Zivot-Andrews (1992) test for a unit root against the alternative of stationarity with a single structural break is applied to all eight variables, allowing the break date to be endogenously determined. Results confirm that the null of a unit root cannot be rejected for any variable in levels even after allowing for a structural

break, while first differences are stationary. The endogenously identified break dates cluster around 2008–2009 (global financial crisis) and 2015–2016 (domestic recession), consistent with known macroeconomic disruptions in Nigeria. The standard ADF and PP I(1) classification is therefore maintained.

The Johansen cointegration results in Table 1 are supplemented with the Gregory-Hansen (1996) test, which allows for a structural break in the cointegrating vector at an unknown date. For all four cointegrating relationships, the Gregory-Hansen ADF*, Zα*, and Zt* statistics reject the null of no cointegration with a structural break, confirming that the long-run equilibrium relationships are robust to the possibility of a regime shift. The Gregory-Hansen procedure identifies the most likely break date as 2016Q1, coinciding with the onset of the Nigerian recession. To further assess subsample stability, the VECM is re-estimated over two subperiods: 1985Q1–2015Q4 (pre-crisis) and 2016Q1–2022Q4 (post-recession). The cointegrating relationships and the signs of the long-run coefficients are preserved across both subperiods, confirming that the findings reported in Table 2 are not artefacts of the 2015–2016 disruption. The magnitude of some coefficients differs across subperiods, reflecting the structural shift, but the qualitative conclusions about the direction of effects and the role of macroeconomic instability as a growth constraint remain intact. Full structural break test statistics and subsample VECM estimates are available from the authors upon request.

Johansen–Juselius Cointegration Results

Table 1: Johansen–Juselius Cointegration Results. ***, **, * = significant at 1%, 5%, 10%.

Null Hypothesis	Trace Stat.	CV (5%)	Max-Eigen Stat.	CV (5%)
r = 0	384.21***	197.37	112.44***	58.43
r ≤ 1	271.77***	159.53	87.32***	52.36
r ≤ 2	184.45***	125.62	71.18**	46.23
r ≤ 3	113.27**	95.75	52.63*	40.08
r ≤ 4	60.64	69.82	31.14	33.88

Both trace and maximum-eigenvalue statistics reject the null of at most three cointegrating vectors, confirming four stable long-run equilibrium relationships among the eight variables. This multi-dimensional cointegration confirms the appropriateness of the VECM framework and demonstrates that Nigeria's capital market, macroeconomic conditions, and real output are structurally bound in long-run equilibrium.

VECM Long-Run and Adjustment Results

Table 2: VECM Long-Run Normalised Coefficients and ECT. ***, **, * = significant at 1%, 5%, 10%.

Variable	Coefficient	t-Statistic	Interpretation
MCP	0.0423***	(4.87)	Market cap supports long-run growth
ASI	0.0018*	(1.78)	Share index modest positive LR effect
NOS	0.0091**	(2.34)	Trading volume supports LR growth
INF	-0.0267***	(-3.91)	Inflation significantly impedes growth
EXC	-0.0183**	(-2.65)	Depreciation constrains long-run growth
FD	-0.0144*	(-1.88)	Fiscal deficit has negative LR effect
GD	-0.0321***	(-4.10)	Government debt significantly constrains growth
ECT(-1)	-0.0891***	(-5.23)	~8.9% disequilibrium corrected per quarter

All capital market variables carry positive long-run coefficients, confirming their growth-promoting function when macroeconomic conditions are supportive. Market capitalisation has the largest and most significant positive coefficient, underscoring its role as the primary channel through which the capital market facilitates

productive investment. Among macroeconomic variables, government debt has the largest negative coefficient (-0.0321), followed by inflation (-0.0267), indicating that Nigeria's expanding public debt burden and chronic inflationary environment are the most binding macroeconomic constraints on long-run growth. The ECT coefficient of -0.0891 indicates that approximately 8.9 percent of any short-run disequilibrium is corrected each quarter, implying a full adjustment horizon of approximately 11 quarters—reflecting the structural rigidities characteristic of Nigeria's economy. This speed-of-adjustment estimate pertains to the LRGDP equation of the VECM; the remaining equations exhibit heterogeneous adjustment speeds consistent with the multi-cointegration structure.

VECM Residual Diagnostic Tests

Residual diagnostic tests are conducted on the VECM to validate the specification. The Breusch-Godfrey LM test for autocorrelation yields LM(1) = 1.43 (p = 0.23) and LM(4) = 1.87 (p = 0.11), confirming the absence of serial correlation in the VECM residuals at the chosen lag order of three. White's test for heteroskedasticity yields a chi-squared statistic of 84.21 (p = 0.19), indicating that the null hypothesis of homoskedastic residuals cannot be rejected. The Jarque-Bera test for normality of residuals yields a statistic of 18.64 (p = 0.047), suggesting mild non-normality in the VECM residuals. However, given the large sample size (T = 152) and the known distributional heterogeneity of the macroeconomic series documented in Section 4.1, mild non-normality is an expected feature and does not invalidate the Johansen maximum-likelihood inference, which is robust to non-normality in large samples (Johansen, 1995; Gonzalo, 1994). These diagnostic results collectively confirm that the VECM is well-specified and that the reported long-run coefficients and error correction dynamics are reliable.

Quantile-on-Quantile Regression Results

The QQR analysis estimates $\beta_1(\theta,\tau)$ across $\theta \in \{0.10, 0.25, 0.50, 0.75, 0.90\}$ and $\tau \in \{0.10, 0.25, 0.50, 0.75, 0.90\}$ for each variable. The coefficient $\beta_1(\theta,\tau)$ captures the quantile-specific association between the τ-th quantile of each explanatory variable and the θ-th quantile of GDP growth; these estimates should be interpreted as distributional co-movements rather than causal effects, given the limitations of the QQR framework in addressing endogeneity (see Section 5.4). The key findings are summarised below.

Table 3: Summary of QQR Coefficient Signs and Significance Across Quantile States.

Variable	Lower Quantile State (τ = 0.10–0.30)	Upper Quantile State (τ = 0.70–0.90)
MCP	Positive but insignificant across all θ — shallow markets cannot mobilise growth	Strongly positive and significant at upper θ — deep markets amplify high-growth regimes
ASI	Negative at most θ — market downturns suppress growth through wealth and confidence channels	Positive and significant at middle–upper θ — bull markets reinforce growth momentum
NOS	Positive but modest across θ — low-liquidity period has limited growth transmission	Significant positive effect at mid–upper θ — high trading volume improves capital allocation
INF	Modest negative, often insignificant — mild inflation may temporarily stimulate demand	Large and significant negative at lower θ — high inflation most destructive in weak-growth regimes
EXC	Mildly negative — depreciation ambiguous in oil-export economy	Large negative, esp. at lower θ — severe depreciation creates double adverse shock on growth
GD	Positive and significant — moderate debt finances productive public investment	Significant negative — high debt crowds out private investment and undermines confidence

The QQR results collectively reveal a pattern of distributional complementarity and vulnerability. The growth-associated contribution of capital market development is contingent on the economy already operating in a favourable distributional state; capital market instruments are not sufficient to independently lift the economy from its lower distributional positions. Conversely, macroeconomic instability—particularly high inflation and

severe exchange rate depreciation—is most strongly associated with adverse growth outcomes precisely when the economy is weakest, amplifying downturns and retarding recovery. These patterns are interpreted as quantile-specific associations rather than causal effects; the QQR framework does not resolve endogeneity, and the simultaneous inclusion of variables in the VECM but individual assessment in QQR introduces the possibility of omitted variable concerns at the distributional level. The non-monotonic government debt result identifies an approximate threshold at a government debt-to-GDP ratio of around 30–35 percent, based on the sign reversal of $\beta_1(\theta,\tau)$ across the government debt quantile distribution, beyond which Nigeria's public debt trajectory becomes associated with growth inhibition—a finding of immediate policy relevance given the debt-to-GDP ratio exceeding 36 percent since 2017 (DMO, 2022). These distributional asymmetries, invisible to ARDL and OLS methods, constitute the study's primary empirical contribution.

Granger Causality

VECM-based Granger causality tests confirm bidirectional causality between market capitalisation and economic growth, lending joint support to the supply-leading and demand-following hypotheses. Unidirectional causality runs from inflation and exchange rate to economic growth, establishing macroeconomic instability as an antecedent condition rather than a consequence of weak output at the quarterly frequency.

CHAPTER FIVE: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary

Using 152 quarterly observations over 1985–2022, this study applied Johansen–Juselius cointegration, VECM, and QQR to examine the distributional relationship between capital market development, macroeconomic instability, and economic growth in Nigeria. Four cointegrating vectors confirm structural long-run linkages. VECM results identify MCP, ASI, and NOS as positive long-run growth drivers and INF, EXC, FD, and GD as negative constraints, with a moderate speed of adjustment of 8.9 percent per quarter. QQR analysis reveals that these relationships are strongly heterogeneous: the capital market–growth complementarity is realized only in upper-quantile distributional states for both variables; inflation and exchange rate volatility are most destructive during low-growth regimes; and government debt has a non-monotonic effect with a meaningful threshold beyond which it impedes rather than supports growth.

Conclusion

Nigeria's capital market reforms have expanded market infrastructure but their growth-enhancing potential remains constrained by chronic macroeconomic instability. The QQR findings demonstrate that this is not a simple linear relationship: capital market depth and macroeconomic stability are complementary, and each reinforces the efficacy of the other. Policies that develop the capital market in isolation from macroeconomic stabilisation will have limited impact, while macroeconomic reforms that ignore capital market deepening will forgo an important growth transmission channel. A coordinated, heterogeneity-aware policy architecture addressing both dimensions simultaneously is therefore essential for Nigeria to realise the full growth potential of its capital market.

Policy Recommendations

- Inflation targeting: The QQR results identify high-inflation episodes as most destructive to growth during lower-quantile regimes, providing strong motivation for a formal inflation-targeting framework. However, Nigeria's institutional context constrains a direct adoption of full-fledged inflation targeting: fiscal dominance—whereby large financing requirements of the federal government undermine the CBN's operational independence—remains a binding constraint on monetary policy effectiveness. Intermediate steps should therefore precede formal targeting. These include: enhancing the transparency and communication of the Monetary Policy Committee (MPC) through regular publication of inflation forecasts and voting records; strengthening coordination mechanisms between the CBN and the Federal Ministry of Finance to reduce fiscal pressure on monetary policy; and establishing a credible medium-term inflation objective as an anchor for expectations. Full adoption of an inflation-targeting regime

should be sequenced as a medium-term goal, contingent on measurable progress in fiscal consolidation and central bank operational independence.

- Capital market deepening: The SEC and NGX should incentivise large-firm listings, develop derivatives markets, and attract long-term institutional investors to expand market capitalisation and liquidity into upper quantile states where growth complementarities are strongest. However, supply-side incentives for large-firm listings will have limited impact without addressing demand-side constraints. Specifically, investor protection frameworks should be strengthened through enhanced enforcement of disclosure requirements and insider trading regulations; corporate governance standards should be raised to make listed firms more attractive to domestic pension funds and foreign portfolio investors; and the legal infrastructure for minority shareholder rights should be modernised. These demand-side reforms are necessary conditions for the capital market to absorb large-firm listings and translate them into meaningful liquidity improvements.
- Fiscal consolidation: The Federal Ministry of Finance and Debt Management Office should pursue credible medium-term debt reduction to remain below the threshold at which government debt becomes growth-inhibiting. The QQR coefficient surfaces for government debt suggest an approximate threshold in the range of 30–35 percent of GDP, based on the quantile at which $\beta_1(\theta,\tau)$ transitions from positive to negative across the government debt distribution. Nigeria's debt-to-GDP ratio exceeded 36 percent in 2017 and has continued to rise, suggesting the economy is operating beyond this threshold. This quantification, while approximate, provides a practical fiscal anchor: the DMO's medium-term debt management strategy should target a gradual reduction toward the 30–35 percent range over a credible horizon, prioritising domestic revenue mobilisation and rationalisation of non-essential recurrent expenditure over additional external borrowing.
- Exchange rate predictability: CBN exchange rate policy should reduce abrupt depreciation episodes, which QQR results show are most damaging during low-growth regimes.
- State-contingent policy design and reform sequencing: Macroeconomic and capital market policies should be calibrated to the prevailing distributional state of the economy, applying more intensive stabilisation tools during lower-quantile growth phases and deploying capital market deepening measures most aggressively during stable, upper-quantile phases. A reform sequencing framework distinguishes between short-term stabilisation priorities and long-term structural reforms. In the short term (0–2 years), priority should be given to fiscal consolidation, exchange rate stabilisation, and enhancement of MPC transparency, as these address the most binding macroeconomic constraints identified by the QQR results during low-growth regimes. In the medium term (2–5 years), investor protection reforms, corporate governance upgrades, and MPC committee capacity enhancements create the institutional foundations for credible inflation targeting and deeper capital markets. In the long term (5–10 years), formal inflation targeting, large-firm listing incentives, and derivatives market development can be pursued from a position of greater macroeconomic stability, maximising their growth complementarity effects in upper-quantile distributional states.

Limitations and Directions for Future Research

Several methodological limitations should be acknowledged. First, the QQR framework of Sim and Zhou (2015) captures quantile-specific co-movements between variables but does not resolve endogeneity. The simultaneous inclusion of variables in the VECM but individual assessment in QQR introduces the possibility of omitted variable concerns at the distributional level: when each variable is assessed individually against GDP growth, the influence of other variables in the system is not explicitly controlled at the quantile level. While the VECM stage controls for long-run equilibrium relationships and the Granger causality results provide a partial basis for directional inference, the QQR coefficient surfaces should be interpreted as conditional associations rather than structural causal effects. Future research could address this limitation through the application of instrumental variable approaches within the QQR framework, drawing on recent advances in IV quantile regression (Chernozhukov and Hansen, 2005) to obtain more robust causal estimates at specific quantiles.

Second, this study is limited to Nigeria, and the country-specific institutional, structural, and macroeconomic features of the findings may not generalise to other African economies without further validation. Future research could extend the QQR framework to a panel of African economies—including Ghana, Kenya, South Africa, and Egypt—using panel QQR methods (Galvao and Montes-Rojas, 2010) to assess whether the distributional

complementarity between capital market development and macroeconomic stability is a pan-African phenomenon or a Nigeria-specific finding. Such extensions would substantially enhance the cross-country policy relevance of this line of research. Third, the pre-2010 interpolation of quarterly GDP data, while validated by robustness checks (Section 3.1.1), introduces measurement uncertainty that cannot be fully eliminated. Restricting the analysis to the post-2010 official data period, as shown in the sensitivity analysis, yields consistent qualitative findings, but the reduced sample size (52 observations) limits the power of some tests. Longer time series of official quarterly data as they become available will improve estimation precision in future work.

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