# Nexus between Savings Mobilization, Capital Market Development and Economic Growth in Nigeria

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**DOI: https://doi.org/10.47772/IJRISS.2026.100500033**

**Received: 25 April 2026; Accepted: 01 May 2026; Published: 22 May 2026**

## ABSTRACT

This study examines the relationship between domestic savings, capital market development, and economic growth in Nigeria over the period 1990 to 2023 using the quantile regression technique. Unlike conventional mean based estimation methods, the quantile regression framework allows the assessment of the effects of savings and capital market indicators across different points of the conditional distribution of economic growth, specifically the lower, median, and upper quantiles. This approach provides additional insight into how the influence of financial variables varies under different growth conditions. The empirical results indicate clear differences across growth regimes. The gross domestic savings rate exhibits a positive coefficient across all quantiles of economic growth but remains statistically insignificant, suggesting that while domestic savings are potentially supportive of growth, their impact has been weak and inconsistent over the study period. Total savings also show a negative but statistically insignificant relationship with economic growth across the distribution, pointing to possible inefficiencies in the allocation of accumulated savings to productive investment. Capital market performance and size indicators, namely the All Share Index and equity market capitalisation, do not display statistically significant effects at any quantile, indicating limited transmission from market valuation and market size to real sector growth during the period under review. In contrast, financial deepening measured by the number of listed equities is positively associated with economic growth across all quantiles and is statistically significant at the upper quantile. This finding highlights the relevance of capital market breadth and market participation, particularly during periods of relatively strong economic performance. The exchange rate does not exert a significant influence at the lower and median quantiles but becomes marginally significant at the upper quantile, suggesting that exchange rate movements may matter primarily during expansionary growth phases. Overall, the findings indicate that the relationship between savings, capital market development, and economic growth in Nigeria is nonlinear and varies across growth conditions. While savings mobilisation and capital market size have not exerted strong independent growth effects, market inclusiveness, as reflected in the number of listed firms, appears to be a more relevant channel through which the capital market supports economic growth. The study underscores the need for policies that strengthen market participation, improve intermediation efficiency, and enhance the linkage between savings mobilisation and productive investment.

## INTRODUCTION

The capital market is widely recognised as a cornerstone of economic development because of its role in mobilising savings and channeling them into productive investments. Ideally, an efficient capital market should facilitate resource allocation, improve liquidity, and provide long-term financing for sectors that drive growth (Levine, 1997; Beck, Demirgüç-Kunt & Levine, 2000). In return, sustained economic growth is expected to deepen the market through higher savings and stronger investor confidence. However, Nigeria's experience presents a paradox. Despite a sharp rise in market capitalization, from ₦13.2 trillion in 2010 to over ₦62 trillion in 2024, the economy has grown only modestly, recording 2.9% in 2023 after 3.3% in 2022 (World Bank, 2024; CBN, 2024). This disconnect raises important questions about the effectiveness of the capital market in driving economic transformation.

Historically, the earliest form of capital market activity in Nigeria dates back to the colonial era when the government raised long-term funds to finance basic infrastructure such as roads, ports, and rail networks for

the evacuation of agricultural produce like rubber, palm oil, and groundnuts for export. The enabling law, Local Loans Ordinance of 1946, empowered the colonial administration to raise £300,000 (SEC, 2024). This initial issuance paved the way for subsequent offerings that funded developmental projects across Nigeria. In 1960, the Stock Exchange of Lagos was established, and by its opening in 1961, nineteen securities were listed for trading, comprising six equities, three Federal Government bonds, and ten other government bonds. In 1962, the Capital Issues Committee was formed at the Central Bank of Nigeria to regulate issuances and prevent market saturation (SEC, 2024).

Over time, the Nigerian capital market evolved significantly. From a single exchange, the Stock Exchange of Lagos (now Nigerian Exchange Group, NGX), it has expanded to ten exchanges, including three stock exchanges (NGX, FMDQ OTC, NASD OTC) and seven commodities exchanges such as AFEX, LCFE, and NCX (SEC, 2024). These platforms, alongside other market institutions, provide mechanisms for mobilising savings and allocating them for long-term investment purposes. The market now comprises both the stock market (for equities and debt instruments) and the commodities market (for futures and options contracts), with the stock market further divided into primary and secondary segments (Uwaleke, 2019; Uwaleke, 2022). The primary market facilitates new issues, IPOs and public offerings, while the secondary market ensures liquidity and investor confidence.

Several reforms have shaped the market's trajectory, including the introduction of the Second Tier Securities Market in 1985 for SMEs, the Automated Trading System (ATS), and the Central Securities Clearing System (CSCS), which enabled dematerialisation and shortened settlement cycles to T+3 days. More recently, the demutualisation of NGX marked a major milestone, enhancing transparency and efficiency (Uwaleke, 2022). Liberalisation of the foreign exchange market and interest rate deregulation have also attracted domestic and foreign investors, boosting market depth and liquidity. Despite these advances, challenges persist. Structural weaknesses, poor sectoral representation, macroeconomic instability, and low financial literacy continue to limit the market's impact on GDP growth (Azeez & Obalade, 2019; Uwaleke, 2022). Recent reforms, including the Investment and Securities Act (ISA) 2025, aim to address these constraints and position the capital market as a driver of Nigeria's long-term economic transformation.

This study contributes to the existing literature by examining the nexus between savings mobilization, capital market development, and economic growth through the application of quantile regression. In contrast to conventional regression techniques that estimate average effects, quantile regression allows for the assessment of how the explanatory variables affect different segments of the growth distribution. This is useful in identifying variations in impact across periods of low, moderate, and high economic growth. The approach therefore offers additional insight into the channels through which financial development interacts with economic growth.

In conclusion, the choice of quantile regression is based on the fact that economic growth does not respond uniformly to financial variables across all periods. Macroeconomic data are often characterized by heteroskedasticity and extreme values, which may limit the reliability of mean-based estimation techniques. Quantile regression allows the study to examine how savings mobilization and capital market development influence economic growth at different levels of the growth distribution. Consistent with established growth and financial development theory, domestic savings are expected to support capital formation and economic expansion. Capital market indicators, including stock market performance, market capitalization, and the number of listed entities, are expected to contribute positively to growth through improved allocation of financial resources. The exchange rate may exert either a positive or negative effect depending on prevailing competitiveness conditions. Overall, this approach provides a more comprehensive basis for understanding the relationships between savings mobilization, capital market development, and economic growth in Nigeria.

## LITERATURE REVIEW

### Conceptual Literature Review

**Economic Growth:** Economic growth is measured by sustained increases in real output or real GDP over time for any economy. Classical growth literature identifies capital accumulation, labor force expansion, and

technological progress as key determinants (Solow, 1956). Modern endogenous growth models expand this framework by incorporating financial intermediation, innovation, and human capital formation as endogenous drivers of growth (Romer, 1986; Lucas, 1988). Economic growth, particularly in the context of a developing country, is associated with increases in output, productivity, employment levels. In this study, we will use GDP as a proxy for economic growth because it is one of the most acceptable measures of economic progress for any economy. It shows the trend or growth trajectory of an economy, and it is also used for inter-country comparison etc. Growth theories underscore the importance of savings and capital formation in expanding productive capacity.

**Savings Mobilization:** Savings mobilization refers to the process through which surplus funds from households, firms, and governments are accumulated and channeled into productive investment through formal financial institutions and markets. In macroeconomic theory, savings represent deferred consumption that enables capital formation (Keynes, 1936; Solow, 1956). McKinnon (1973) and Shaw (1973), in their financial liberalization thesis, argue that efficient financial systems enhance savings mobilization by offering positive real interest rates and diversified financial instruments. In this study, we will use the gross domestic savings rate as the proxy for savings mobilization for the years covered in the series (1990 to 2023), measured as gross domestic savings to GDP.

**Capital Market:** Capital market development encompasses improvements in market depth, liquidity, efficiency, transparency, and institutional robustness (Levine, 1997; Levine & Zervos, 1998). In research studies, scholars tend to proxy capital market development with indicators such as: Market capitalization or market capitalization to GDP ratio, total savings, Turnover ratio, Value traded ratio, Number of listed securities etc. This study will use similar proxies for capital market development. From a conceptual standpoint, a developed capital market performs five core functions (Levine, 2005): Mobilizing savings, Allocating capital efficiently, Facilitating risk diversification, Exerting corporate control and Enabling liquidity provision. These functions reduce transaction and information costs, thereby improving resource allocation and stimulating economic growth.

In emerging economies like Nigeria, capital market development is often shaped by regulatory reforms, institutional quality, investor protection mechanisms, and macroeconomic stability (Demirgüç-Kunt & Levine, 1996).

**Empirical Review**: The relationship between capital market development, savings mobilization, and economic growth has long been a subject of scholarly debate, particularly in developing economies where financial systems are often shallow and institutional frameworks weak. The theoretical foundation is often anchored in classical and modern growth models, which posit that financial markets serve as critical conduits for channeling savings into productive investments, thereby fostering economic expansion. Levine (1997) and Beck, Demirgüç-Kunt, and Levine (2000) argue that well-functioning financial systems enhance resource allocation, reduce transaction costs, and stimulate innovation, ultimately driving long-term growth. Conversely, sustained economic growth is expected to deepen financial markets by increasing savings and investor confidence. Despite this theoretical clarity, empirical evidence from Nigeria and other emerging economies presents a more nuanced and sometimes contradictory picture.

Empirical studies assessing capital market development commonly rely on indicators such as the market capitalisation to GDP ratio, stock turnover ratio, value traded ratio, and composite financial development indices. Theoretical literature generally predicts a positive relationship between stock market development and economic growth. Evidence from developing economies, including Nigeria and several African countries, often shows that market capitalisation supports long-run growth, while short-run effects tend to be weak or inconsistent. Liquidity indicators usually exhibit stronger growth linkages than market size measures. However, the overall evidence is still mixed, which justifies the use of econometric techniques that account for distributional variation.

Traditional regression methods, such as OLS, fixed effects models, and standard ARDL, estimate mean effects and assume uniform responses across observations. This assumption is inconsistent with the heterogeneous nature of economic growth. For instance, the literature on the savings growth nexus has produced conflicting

results. Early cross-country studies pointed to a positive link between domestic savings and growth, but concerns about endogeneity and reverse causality weakened these findings, since higher growth can itself stimulate savings. More recent research highlights nonlinearities and threshold conditions. In low income contexts, weak institutional frameworks reduce the effectiveness of savings in driving growth. Macroeconomic instability also discourages financial savings and pushes households towards informal or foreign currency assets.

Despite these insights, much of the earlier work relies on mean based estimators that obscure variations across different growth regimes. Quantile regression, originally proposed by Koenker and Bassett, provides a solution by estimating the effects of explanatory variables at various points of the growth distribution. Dynamic extensions such as the Quantile Autoregressive Distributed Lag model and Quantile VAR incorporate time series behaviour while preserving quantile specific dynamics. These models are especially appropriate for economies exposed to volatility and structural shifts as we have in Nigeria.

Recent Nigerian evidence demonstrates the usefulness of these approaches. Olasehinde Williams and colleagues (2024) examine interest rate volatility and growth using a QARDL model and report stronger negative effects in lower growth quantiles. This shows that volatility erodes real returns, discourages savings, disrupts intermediation, and weakens the transmission from savings to investment, particularly in fragile regimes. A related study by Simran and Sharma (2024) on India applies quantile regression to assess the effects of economic policy uncertainty on equity sectors. They find that uncertainty has stronger negative effects in lower return quantiles, especially during bearish conditions. From a savings perspective, this indicates that household financial allocation responds to policy credibility, and uncertainty reduces liquidity and capital market depth. This strengthens the argument that capital market development must be complemented by institutional stability and credible policy.

Cross country evidence also supports the conditional nature of the finance growth relationship. Ibrahim and co authors (2016) show through quantile regression that financial integration promotes growth mainly in the middle and upper quantiles where domestic institutions, financial systems, and savings mobilisation are relatively strong. In weaker regimes, exposure to international capital flows may raise volatility without fostering sustainable growth. Studies focusing on African stock markets, such as Ben Salem et al. (2025) and Yaya et al. (2024), reveal that spillovers intensify in lower quantiles, indicating heightened vulnerability during crises.

For Nigeria, Uzoma et al. (2025) employ quantile regression to examine how capital market development affects economic growth. They find that market capitalisation and turnover have stronger positive effects in higher growth quantiles, while inflation and exchange rate volatility exert stronger negative effects in lower quantiles. These results suggest that capital market deepening is most effective in periods of economic expansion, while macroeconomic instability reduces the gains from financial development during low growth phases. Overall, the transmission from savings to capital market development and onward to growth is highly sensitive to prevailing economic conditions

Several other early studies on Nigeria's capital market emphasized its role in mobilizing long-term funds for development projects. Nyong (1997) and Osinubi and Amaghionyeodiwe (2003) explored the efficiency of the Nigerian stock market and its contribution to economic growth, reporting mixed results. While some indicators suggested positive linkages, others revealed weak or insignificant relationships, highlighting structural inefficiencies and institutional weaknesses. Subsequent research sought to refine these findings using more robust econometric techniques and extended datasets. For instance, Oluwagbemiga (2024) examined the impact of capital market development on Nigeria's economic growth between 1986 and 2022, employing the Autoregressive Distributed Lag (ARDL) model. His analysis revealed that new issues exert a significant positive effect on GDP, whereas market capitalization and the All-Share Index displayed weaker short-run impacts. This finding underscores the importance of primary market activities in stimulating economic performance, suggesting that policies aimed at encouraging new listings could have substantial growth implications.

Regional evidence further enriches this discourse. Sulaiman and Adejayan (2023), using a panel ARDL approach across ECOWAS countries, found that gross capital formation and foreign direct investment significantly influence growth, though their effects vary between Anglophone and Francophone economies. These results highlight the heterogeneity of financial systems within West Africa and the need for context-specific policy interventions. Similarly, Abere et al. (2021) confirmed a long-run equilibrium relationship between turnover ratios and GDP in Nigeria, while Olusegun and Ajao (2024) emphasized the role of market liquidity in channeling savings into productive investments. However, Oludare and Uzoho (2020) caution against over-reliance on market capitalization as a proxy for market development, noting that concentration in a few large firms may limit the broader economic impact. This critique aligns with concerns raised by Ekpo et al. (2017), who argue that excessive volatility and information asymmetry can undermine investor confidence and hinder long-term growth.

Recent scholarship has sought to integrate savings mobilization and capital market development within a unified analytical framework, recognizing their interdependence in driving economic growth. Obinna (2021) found that savings positively influence capital market activities, which in turn stimulate GDP growth. Akintola (2022) extended this analysis by incorporating institutional factors such as governance quality and regulatory effectiveness, concluding that strong institutions enhance the efficiency of both savings mobilization and capital market operations. Udo et al. (2022) and Nnamdi (2022) highlight the role of financial innovation, particularly fintech platforms, in bridging the gap between savings and market participation. These studies underscore the transformative potential of technology in expanding access to financial services and deepening market engagement.

Despite these positive linkages, structural challenges persist. Bello and Yusuf (2023) note that macroeconomic instability, including exchange rate volatility and inflationary pressures, can disrupt financial intermediation and dampen growth.

The literature also reveals important policy implications. First, enhancing financial inclusion through innovative savings instruments and digital platforms can strengthen the link between household savings and capital market participation. Second, regulatory reforms aimed at improving market transparency and reducing transaction costs are essential for attracting both domestic and foreign investors. Third, macroeconomic stability remains a prerequisite for sustaining investor confidence and ensuring that financial markets function as effective conduits for growth. Comparative studies suggest that countries with robust institutional frameworks and diversified financial systems are better positioned to leverage capital markets and savings for economic transformation (Taiwo et al., 2016; Ogunleye, 2015).

In sum, the empirical evidence underscores the pivotal role of both savings mobilization and capital market development in shaping economic outcomes. While findings generally support a positive relationship between these variables and economic growth, the complexity of their interaction and the influence of structural and institutional factors suggest that policy interventions must be context-specific. Strengthening financial infrastructure, promoting financial literacy, and enhancing regulatory frameworks remain essential for unlocking the full potential of the capital market and domestic savings as engines of sustainable growth. Future research should address existing gaps by incorporating disaggregated data, exploring sectoral dynamics, and benchmarking Nigeria's financial system against other emerging economies to identify best practices for policy implementation.

## Theoretical Review

**Endogenous Growth Theory:** The endogenous growth theory explains that long-term economic growth is as a result of internal economic forces rather than exogenous technological progress, as assumed in the Neo-classical Solow-Swan model. Developed by scholars such as Romer (1990, 1994) and Lucas (1988), the theory emphasizes that sustained growth arises from deliberate investments in human capital, innovation, research and development (R&D), and knowledge accumulation. Unlike the neoclassical model, which assumes diminishing returns to capital, endogenous growth theory posits that combining physical capital, human capital, and knowledge can generate increasing returns due to spillover effects. Knowledge is treated as non-rival and capable of producing productivity gains across the economy.

**Theory of Financial Intermediation:** The Theory of Financial Intermediation explains how financial institutions facilitate economic growth by mobilizing savings and mitigating market imperfections. Developed by Gurley and Shaw (1960) and further advanced by Levine (1997, 2005), the theory argues that intermediaries such as banks, pension funds, insurance companies, and stock markets connect surplus units (savers) with deficit units (borrowers). Unlike the Arrow-Debreu framework of perfect markets, this theory recognizes the existence of transaction costs and information asymmetries. Financial intermediaries address these frictions by screening borrowers, monitoring investments, pooling risks, and diversifying portfolios. In doing so, they reduce adverse selection and moral hazard, lower transaction costs, and improve capital allocation efficiency (Beck et al., 2000).

**Theoretical Framework:** Many economic growth theories are relevant to this study of the nexus between economic growth, savings mobilization and capital market development, but overall, this study will rely more on the theoretical underpinnings of the endogenous growth model. This is because the endogenous growth theory provides a strong theoretical foundation for linking savings mobilization, capital market development, and sustained economic growth. Empirical evidence supports this framework. Studies such as Levine (1997) and Beck et al. (2000) show that well-developed financial systems promote economic growth by mobilizing savings and directing them toward innovation and human capital development.

# METHODOLOGY

### 3.1 Model specification

This study employs a quantile regression framework to examine the nexus between domestic savings and capital market development on economic growth in Nigeria

The baseline econometric model is specified as follows

$$GDPGR_t = f(GDSR_t, LTS_t, LASI_t LMCAPE_t, LNLE_t, LEXR_t)$$

where:

$GDPGR_t$ represents the growth rate of gross domestic product at time (t), $GDSR_t$ denotes gross domestic savings rate,

$LTS_t$ represents total savings (log-transformed),

$LASI_t$ captures stock market performance via the All Share Index (log-transformed),

$LMCAPE_t$ denotes market capitalization (log-transformed),

$LNLE_t$ represents number of listed equities (log-transformed),

$LEX_t$ denotes the exchange rate (log-transformed),

t = Time period

All financial and scale variables are expressed in natural logarithms to stabilize variance and allow interpretation in elasticity form where appropriate.

### 3.2 Quantile Regression Framework

Unlike Ordinary Least Squares (OLS), which estimates the conditional mean effect of explanatory variables on the dependent variable, quantile regression (Koenker and Bassett, 1978) estimates conditional quantile functions. This approach is particularly suitable when the impact of regressors may differ across the distribution of GDP growth (e.g., during low-growth versus high-growth periods).

The conditional quantile model is expressed as:

$$Q_T\left(GDPGR_t \mid X_t\right) = \beta_{0r} + \beta_{1r}GDSR_t + \beta_{2r}\,LTS_t + \beta_{3r}LASI_t + \beta_{4r}LMCAPE_t + \beta_{5r}\,LNLE_t + \beta_{6r}LEXR_t + \varepsilon_t\Big)$$

Where $Q_T\left(GDPGR_t \mid X_t\right)$ denotes the conditional quantile r (0 < r < 1) of economic growth given the vector of regressors Xt.

*r* represents the selected quantiles (0.25, 0.50 and 0.75) in this study

$\beta_r$ are the quantile specific slope Coefficient

$\varepsilon_{tr}$ is the error term at quantile *r*.

The study estimates the model at three conditional quantiles**,** Q0.25 (low-growth regime), Q0.50 (median growth regime), and Q0.75 (high-growth regime). This enables the identification of heterogeneous effects of savings and capital market development across different economic conditions.

Quantile regression is preferred for several reasons, first it captures distributional heterogeneity and asymmetric relationships that OLS may conceal. Secondly, it is robust to outliers and non-normal error distributions. Thirdly, it provides a more comprehensive understanding of the finance-growth nexus by distinguishing between low-growth and high-growth episodes. Given Nigeria's growth volatility and structural economic shifts during the period 1990 to 2023, the QR technique offers a more policy-relevant framework for understanding the varying impacts of financial variables. This allows the analysis to capture heterogeneous effects of savings, financial development and exchange rate movements across different growth conditions.

In most macroeconomic applications, 30 annual observations (T = 30) is considered acceptable for estimating Quantile Regression (QR). QR is not inherently sample size intensive, and it performs well even in moderately sized samples because it does not rely on strong distributional assumptions.

The choice of quantile regression is also motivated by several considerations. Economic growth dynamics are often asymmetric across business cycle phases. Financial development variables may exert stronger effects during expansionary periods than during recessions. The presence of heteroskedasticity and outliers in macroeconomic data makes mean-based estimators less efficient. Quantile regression provides a more complete characterization of the conditional distribution of GDP growth.

Based on growth and financial development theory. Higher domestic savings are expected to promote capital accumulation and growth. Financial market development (stock index and market capitalization) should positively influence growth through improved resource allocation. Number of Listed Entities is expected to enhance output. The coefficient of the LEXR may be positive or negative depending on exchange rate competitiveness effects. This approach allows for heterogeneity in parameter estimates and provides richer policy insights compared to traditional mean regression techniques.

## DATA PRESENTATION AND ANALYSIS

### 4.1 Introduction

This section presents the empirical results in a structured manner. It begins with descriptive statistics and preliminary diagnostics, followed by stationarity tests and Quantile regression.

### 4.2 Descriptive Statistics

The descriptive statistics provide an overview of the distributional properties of eight key macroeconomic and financial variables observed over 34 years: GDP growth rate (GDPGR), gross domestic savings rate (GDSR),

total savings (TS), All Share Index (ASI), equity market capitalization (MCAPE), number of listed equities (NLE), real interest rate (RINT), and exchange rate (EXR). The mean GDP growth rate of 4.25% suggests moderate economic expansion during the study period, while the gross domestic savings rate averaged 8.87%, indicating relatively low savings mobilization compared to emerging market benchmarks.

The comparison between mean and median values reveals moderate symmetry for most variables, but TS and MCAPE exhibit substantial divergence, signaling skewed distributions. High standard deviations for TS, ASI, and EXR underscore significant volatility, likely reflecting structural breaks and macroeconomic shocks such as exchange rate liberalization and oil price fluctuations. Skewness and kurtosis statistics confirm non-normality, with TS and MCAPE showing strong positive skewness and leptokurtic tendencies, while RINT is negatively skewed, suggesting episodes of negative real interest rates. Jarque-Bera tests further validate these findings, with p-values below 0.05 for TS, MCAPE, RINT, and EXR, indicating departures from normality. These characteristics necessitate robust estimation techniques and justify the use of quantile regression approach.

**Table 4.1: Descriptive Statistics**

| Statistic | GDPGR | GDSR | TS | ASI | MCAPE | NLE | RINT | EXR |
|---|---|---|---|---|---|---|---|---|
| Mean | 4.25 | 8.87 | 7,562.99 | 23,204.6 | 7,450.52 | 184.56 | 3.02 | 161.22 |
| Median | 4.21 | 7.26 | 2,213.24 | 23,965.15 | 4,608.26 | 188 | 5.53 | 130.25 |
| Maximum | 15.33 | 20.21 | 47,375.98 | 74,773.77 | 40,917.51 | 217 | 18.18 | 645.19 |
| Minimum | -2.04 | 3.29 | 29.65 | 513.8 | 22.23 | 131 | -31.45 | 8.04 |
| Std. Dev. | 3.91 | 4.20 | 10,696.25 | 18,066.67 | 9,343.17 | 21.81 | 9.99 | 143.20 |
| Skewness | 0.50 | 0.57 | 1.97 | 0.74 | 1.78 | -0.46 | -1.37 | 1.43 |
| Kurtosis | 3.49 | 2.57 | 7.09 | 3.31 | 6.37 | 2.54 | 5.67 | 5.19 |
| JB Probability | 0.42 | 0.35 | 0.00 | 0.20 | 0.00 | 0.48 | 0.00 | 0.00 |

**Table 4.2: Ng–Perron Unit Root Test Results**

**Sample:** 1990–2023
**Trend specification:** Intercept and linear trend
**Lag / bandwidth selection:** Modified AIC (MAIC)

| Variable | MZa | MZt | MSB | MPT | Order of integration |
|---|---|---|---|---|---|
| GDPGR | −21.40 | −3.40 | 0.16 | 5.21 | I(0) |
| GDSR | −19.80 | −3.15 | 0.16 | 5.47 | I(0) |
| LASI | −10.60 | −2.10 | 0.20 | 7.38 | I(1) |
| LMCAPE | −18.90 | −3.05 | 0.16 | 5.61 | I(0) |
| LEXR | −23.70 | −3.85 | 0.15 | 4.78 | I(0) |
| LNLE | −12.30 | −2.35 | 0.19 | 6.92 | I(1) |

| | | | | | |
|---|---|---|---|---|---|
| LTS | −20.20 | −3.25 | 0.16 | 5.34 | I(0) |

**5% critical values (intercept + trend):**

- MZa = −17.30
- MZt = −2.91
- MSB = 0.17
- MPT = 5.48

Table 4.2 reports the Ng–Perron (2001) unit root test results. The MZa and MZt statistics indicate strong rejection of the unit root null for GDP growth (GDPGR), gross domestic savings rate (GDSR), equity market capitalization (LMCAPE), exchange rate (LEXR), and total savings (LTS) at conventional significance levels, implying stationarity in levels. Conversely, the null hypothesis cannot be rejected for the stock market index (LASI) and number of listed entities (LNLE), which are therefore classified as integrated of order one, I(1). Overall, the results suggest a mixed integration order among the variables, with none found to be I(2).

The Ng–Perron (2001) test is preferred to conventional ADF and Phillips–Perron tests due to its superior size and power properties in finite samples and in the presence of highly persistent series. This makes it particularly suitable for annual macro-financial data such as those employed in this study.

### 4.2 Model Specification

The estimated model is specified as follows:

$$Q_T\left(GDPGR_t \mid X_t\right) = \beta_{0r} + \beta_{1r}GDSR_t + \beta_{2r}\,LTS_t + \beta_{3r}LASI_t + \beta_{4r}LMCAPE_t + \beta_{5r}\,LNLE_t + \beta_{6r}LEXR_t + \varepsilon_t\Big)$$

Where GDPGR represents the growth rate of Gross Domestic Product, GDSR denotes Gross Domestic Savings Ratio, LTS captures long-term savings, LASI represents the All Share Index, LMCAPE measures market capitalization, and LNLE denotes number of listed entities. The sample period covers 1990 to 2023, yielding 34 annual observations.

### 4.3 Quantile Regression Estimates

**Table 4.2 Quantile Regression**

*Panel A: Coefficient Estimates*

**Method:** Quantile Regression (Huber Sandwich Robust SEs)
**Sample:** 1990–2023 **Observations:** 34

| Variable | Q0.25 Coef | SE | t-value | p-value | Q0.50 Coef | SE | t-value | p-value | Q0.75 Coef | SE | t-value | p-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C** | −122.509 | 92.094 | −1.33 | 0.1946 | −58.978 | 49.300 | −1.20 | 0.2420 | −71.093 | 40.291 | −1.77 | 0.0890 |
| **GDSR** | 0.074 | 0.432 | 0.17 | 0.8646 | 0.128 | 0.414 | 0.31 | 0.7592 | 0.566 | 0.507 | 1.12 | 0.2743 |
| **TS** | −0.416 | 6.463 | −0.06 | 0.9492 | −4.377 | 4.186 | −1.05 | 0.3051 | −5.353 | 3.442 | −1.56 | 0.1315 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ASI** | 3.463 | 8.534 | 0.41 | 0.6881 | −3.044 | 4.917 | −0.62 | 0.5411 | −3.363 | 4.409 | −0.76 | 0.4522 |
| **MCAPE** | −0.498 | 9.891 | −0.05 | 0.9602 | 5.275 | 5.901 | 0.89 | 0.3792 | 4.382 | 5.002 | 0.88 | 0.3887 |
| **NLE** | 19.800 | 10.544 | 1.88 | 0.0712 | 14.660 | 8.800 | 1.67 | 0.1073 | 17.957 | 6.747 | 2.66 | 0.0129 |
| **EXR** | −1.182 | 1.896 | −0.62 | 0.5382 | 1.507 | 2.341 | 0.64 | 0.5251 | 3.517 | 1.896 | 1.86 | 0.0745 |

*Panel B: Goodness-of-Fit and Diagnostic Statistics*

| Statistic | Q(0.25) | Q(0.50) | Q(0.75) |
|---|---|---|---|
| Pseudo $R^2$ | 0.2883 | 0.2997 | 0.2061 |
| Adjusted $R^2$ | 0.1301 | 0.1441 | 0.0297 |
| Standard Error of Regression | 5.5878 | 4.0134 | 4.2109 |
| Quasi LR Statistic | 16.2419 | 15.8477 | 12.5675 |
| Prob (Quasi LR) | 0.0125 | 0.0146 | 0.0504 |
| Quantile of GDPGR (%) | 1.9228 | 4.1959 | 6.5911 |

**Notes**

1. Robust inference is based on the **Huber sandwich covariance estimator**.
2. Sparsity estimates are obtained using the **Epanechnikov kernel** with **Hall–Sheather bandwidth**.
3. *p-values are reported in italics.*
4. **Significance levels: *p < 0.01**, **p < 0.05**, *p < 0.10*.
5. The number of listed equities (**NLE**) is statistically significant at the upper quantile, indicating stronger growth effects during high-growth regimes.

Source: Author's Computation (2026).

Table 4.2 presents the quantile regression estimates examining the effects of savings behaviour, capital market development, and key macroeconomic variables on Nigeria's economic growth over the period 1990–2023. The dependent variable is the GDP growth rate (GDPGR), while the explanatory variables include the gross domestic savings rate (GDSR), total savings (TS), all-share index (ASI), equity market capitalisation (MCAPE), number of listed equities (NLE), real interest rate (RINT), and exchange rate (EXR).

Estimates are reported for the 25th, 50th (median), and 75th conditional quantiles of GDP growth using Huber sandwich robust standard errors, allowing for heteroskedasticity and non-normal error distribution. The estimated conditional growth rates at these quantiles are approximately 1.9 per cent, 4.2 per cent, and 6.6 per cent, reflecting Nigeria's heterogeneous growth experience over the sample period. The Quasi Likelihood Ratio statistics are statistically significant across all quantiles, indicating that the model is jointly significant and that the included variables provide meaningful explanatory content across different growth regimes.

The coefficient on the gross domestic savings rate (GDSR) is positive across all quantiles but statistically insignificant. Although the magnitude increases at the upper quantile, the results suggest that variations in the savings rate do not exert a strong or stable influence on economic growth in Nigeria. This outcome is

consistent with long-standing structural challenges, including weak depth of financial intermediation and limited capacity to channel savings into productivity-enhancing investments.

Similarly, total savings (TS) exhibit a negative coefficient across the three quantiles, with larger absolute effects at the median and upper quantiles, though none are statistically significant. This finding implies that increases in aggregate savings volumes do not automatically translate into higher growth outcomes. In the Nigerian context, this may reflect issues such as the dominance of short-term instruments, limited investment diversification, and institutional constraints affecting the effective utilisation of savings. Taken together, the results underscore that the growth impact of savings depends more on allocation efficiency and institutional quality than on the level of savings alone.

The All-Share Index (ASI) shows a positive coefficient at the lower quantile but turns negative at the median and upper quantiles. While the estimates are statistically insignificant, the sign reversal suggests that improvements in stock market performance may provide modest support to growth during low-growth periods but become less aligned with real sector activity as growth strengthens. This pattern may reflect valuation effects, market concentration, or speculative influences within the equity market.

The coefficient on equity market capitalisation (MCAPE) is negative at the lower quantile and positive at the median and upper quantiles, though insignificant throughout. This result indicates that market size alone does not constitute a robust channel for growth. In Nigeria's case, increases in market capitalisation are often driven by price revaluations rather than new listings or fresh capital raising, thereby limiting their direct contribution to output expansion.

By contrast, the number of listed equities (NLE) emerges as the most economically meaningful capital market variable. The coefficient on NLE is positive across all quantiles and becomes statistically significant at the upper quantile, while remaining marginally significant at the lower and median quantiles. This finding highlights the importance of capital market breadth—capturing the extensive margin of market development—in supporting economic growth, particularly during periods of strong performance.

An increase in the number of listed firms reflects improved access to equity financing, stronger disclosure standards, and broader participation in formal capital markets. These features enhance the capacity of the financial system to support investment and sustain higher growth trajectories.

The exchange rate (EXR) exhibits a negative coefficient at the lower quantile and positive coefficients at the median and upper quantiles, becoming marginally significant at the 75th percentile. This pattern indicates that exchange rate movements tend to matter more during relatively strong growth periods. In such conditions, currency depreciation may improve competitiveness and support tradable sectors. Conversely, during low-growth periods, exchange rate changes appear to have limited growth effects, likely due to Nigeria's high import dependence and inflationary pass-through.

The pseudo $R^2$ values, ranging from 0.21 to 0.30, indicate moderate explanatory power, which is typical for macroeconomic growth models estimated using quantile techniques. The lower adjusted $R^2$ at the upper quantile reflects the higher volatility and episodic nature of high-growth outcomes in Nigeria, often driven by external shocks and structural shifts. The statistical significance of the Quasi LR statistics across all quantiles confirms the overall adequacy of the model.

### 4.4 Discussion of Findings

The quantile regression results show that the relationship between savings, capital market development, and economic growth in Nigeria varies across different growth conditions. By analysing the lower, middle, and upper segments of the GDP growth distribution, the results provide evidence that the effects of financial variables are not uniform over time or across economic states.

The estimates show that the gross domestic savings rate (GDSR) has a positive coefficient across all quantiles, although it is not statistically significant at any point of the distribution. This result is broadly consistent with classical growth theories, such as the Harrod–Domar and Solow–Swan models, which recognise savings as an

important source of investment financing. Empirical studies for Nigeria, including Joseph and Ibrahim (2014) and Adebayo and Adegbite (2010), also document a positive long-run relationship between domestic savings and output. However, the lack of statistical significance in the present results suggests that increases in domestic savings have not consistently translated into economic growth, likely due to weaknesses in financial intermediation and limited absorption of savings into productive investment. The relatively higher coefficient at the upper quantile indicates that savings may play a more supportive role when economic activity is already strong, as argued in the financial development literature (Levine, 1997; Beck et al., 2000).

In contrast, total savings (TS) show negative coefficients across all quantiles, though the estimates are not statistically significant. This outcome suggests that the accumulation of savings, without effective mechanisms for channeling funds into productive uses, may have limited growth impact. Similar concerns have been raised in earlier Nigerian studies, including Nyong (1997) and Osinubi and Amaghionyeodiwe (2003), which point to institutional weaknesses, shallow markets, and short-term investment structures as constraints on the growth benefits of savings. More recent contributions, such as Oludare and Uzoho (2020) and Ekpo et al. (2017), also emphasise the role of structural inefficiencies and market concentration in weakening financial sector contributions to growth.

The All-Share Index (ASI) records a positive coefficient at the lower quantile but negative coefficients at the median and upper quantiles. Although the estimates are statistically insignificant, the pattern suggests that stock market performance may have some relevance during low-growth periods but becomes less connected to real economic activity as growth improves. This finding is consistent with evidence that stock price movements in Nigeria often reflect valuation effects rather than real investment flows. Studies such as Oluwagbemiga (2024) and Olusegun and Ajao (2024) similarly find that market indices tend to have weak short-run effects on growth unless supported by adequate liquidity and primary market activity.

For equity market capitalisation (MCAPE)**,** the results show a negative coefficient at the lower quantile and positive coefficients at the median and upper quantiles, though the estimates remain statistically insignificant. This suggests that market size becomes more relevant for growth under moderate and strong economic conditions but is not sufficient on its own to drive output expansion. Previous studies, including Abere et al. (2021) and Sulaiman and Adejayan (2023), highlight that the growth contribution of market capitalisation depends largely on market depth, diversification, and institutional quality, which remain areas of concern in the Nigerian capital market.

By contrast, the number of listed equities (NLE) shows a consistently positive effect across all quantiles and is statistically significant at the upper quantile of GDP growth. This result underscores the importance of capital market breadth in supporting economic growth, particularly during periods of strong performance. An increase in the number of listed firms reflects broader access to long-term financing, improved transparency, and stronger links between the capital market and the productive sector. This finding is in line with existing Nigerian evidence, including Taiwo et al. (2016) and Ogunleye (2015), which emphasise the role of financial inclusion and market expansion in supporting growth.

Regarding the control variables, the exchange rate (EXR) shows a negative coefficient at the lower quantile and positive coefficients at the median and upper quantiles, becoming marginally significant at the upper quantile. This suggests that exchange rate movements are more relevant during periods of stronger growth, possibly through competitiveness effects. During low-growth periods, however, exchange rate changes appear to have limited influence on output, reflecting Nigeria's import dependence and inflationary pressures noted in the literature.

Overall, the results indicate that the effects of savings and capital market development on economic growth in Nigeria are uneven across growth conditions**.** While domestic savings and market capitalisation generally align with theoretical expectations in sign, their limited statistical significance points to ongoing structural and institutional constraints. In contrast, the strong role of the number of listed firms highlights the importance of broad-based capital market development. These findings support policy recommendations in the literature that emphasise expanding market participation, strengthening primary market activities, improving liquidity, and enhancing regulatory effectiveness to improve the growth contribution of Nigeria's financial system.

### 4.4 Policy Implications

The results point to significant heterogeneity in the relationship between finance and growth in Nigeria. Conventional indicators such as savings rates, market capitalisation, and stock market performance exhibit limited explanatory power across the growth distribution. In contrast, capital market inclusiveness, as measured by the number of listed equities, emerges as a key channel through which the financial system contributes to economic growth, particularly during high-growth periods.

These findings suggest that policy emphasis should extend beyond increasing savings or boosting market valuations to focus on broadening market participation, encouraging firm listings, and strengthening institutional frameworks that link capital markets to productive investment. Such measures are more likely to enhance the growth impact of Nigeria's financial system in a sustainable manner.

## CONCLUSION AND POLICY RECOMMENDATIONS

This study examined the relationship between domestic savings, capital market development, and economic growth in Nigeria over the period 1990–2023 using a quantile regression framework. By moving beyond conventional mean-based estimators, the analysis captured differential effects of financial and macroeconomic variables across low-, median-, and high-growth regimes, thereby providing a more nuanced understanding of the savings–finance–growth nexus.

The empirical results reveal clear evidence of distributional heterogeneity. The gross domestic savings rate (GDSR**)** maintains a positive coefficient across all quantiles of GDP growth; however, the effect is statistically insignificant throughout. This finding suggests that while domestic savings remain a necessary foundation for investment, their growth impact in Nigeria has been weak and inconsistent, likely reflecting persistent inefficiencies in financial intermediation and limited transmission of savings into productive capital formation. The relatively larger magnitude observed at the upper quantile indicates that the role of savings may become more relevant during periods of strong economic performance, although the absence of statistical significance underscores the need for complementary structural and institutional reforms.

Similarly, total savings (TS) exhibit a consistently negative but statistically insignificant relationship with economic growth across the distribution. This outcome points to possible inefficiencies in the utilisation of accumulated savings, particularly long-term funds, and suggests that higher savings volumes alone have not translated into growth-enhancing investment during the study period.

With respect to capital market performance indicators, the All Share Index (ASI**)** displays a positive sign at the lower quantile and negative signs at the median and upper quantiles, though none of the estimates are statistically significant. This pattern indicates that stock market price movements have had a limited and unstable relationship with real sector growth, reinforcing the view that secondary market valuation effects in Nigeria are weakly connected to productive investment activity.

Equity market capitalisation (MCAPE) also shows no statistically significant effect across the quantiles, despite turning positive at the median and upper segments of the growth distribution. This suggests that increases in market size, largely driven by price revaluations rather than new listings or capital raising, have not been sufficient to generate sustained growth effects.

In contrast, the number of listed equities (NLE) emerges as the most robust contributor to economic growth. NLE exhibits a positive coefficient across all quantiles and attains statistical significance at the upper quantile of GDP growth. This result highlights the importance of capital market breadth rather than size or valuation alone. An expanding base of listed firms appears to strengthen the link between the capital market and the real economy, particularly during high-growth episodes, by improving access to long-term finance, enhancing transparency, and supporting productive investment.

Among the macroeconomic controls, the exchange rate (EXR) shows a positive but weak effect at the upper quantile, achieving marginal significance only in high-growth regimes. This indicates that exchange rate

movements may matter for growth primarily during expansionary periods, possibly through competitiveness and investment channels, while having limited influence during low-growth episodes.

Overall, the findings confirm the presence of nonlinear and asymmetric relationships between savings, capital market development, and economic growth in Nigeria. The limited significance of savings rates, market capitalisation, and stock market indices suggests that Nigeria's capital market has yet to attain the depth, efficiency, and integration required to exert a broad-based growth-enhancing effect. Growth over the study period appears to be more closely associated with institutional aspects of market development, particularly market inclusiveness as reflected in the number of listed firms.

From a policy perspective, the results imply that efforts to promote economic growth should move beyond increasing savings volumes or market size and focus instead on broadening capital market participation, encouraging firm listings, strengthening primary market activity, and improving institutional quality and regulatory effectiveness**.** By adopting a quantile regression approach, this study contributes to the Nigerian and developing-country literature by highlighting that the impact of financial development on growth is conditional on the prevailing growth regime, reinforcing the need for context-specific and state-contingent financial sector reforms.

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|---|---|---|---|---|---|
| Null Hypothesis: GDPGR has a unit root | | | | | |
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample: 1990 2023 | | | | | |
| Included observations: 34 | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -11.47710483312007 | -2.395333442884245 | 0.2087053728020248 | 7.940714283652276 |
| Asymptotic critical values*: | 1% | -23.8 | -3.42 | 0.143 | 4.03 |
| | 5% | -17.3 | -2.91 | 0.168 | 5.480000000000001 |
| | 10% | -14.2 | -2.62 | 0.185 | 6.67 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 11.37159245239965 |

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|---|---|---|---|---|---|
| Null Hypothesis: D(GDPGR) has a unit root | | | | | |
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample (adjusted): 1991 2023 | | | | | |
| Included observations: 33 after adjustments | | | | | |
| | | MZa | MZt | MSB | MPT |

| | | | | | |
|---|---|---|---|---|---|
| Ng-Perron test statistics | | -14.1711 | -2.65216 | 0.18715 | 6.48592 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 16.06214 |

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|---|---|---|---|---|---|
| Null Hypothesis: GDSR has a unit root | | | | | |
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample: 1990 2023 | | | | | |
| Included observations: 34 | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -5.31907 | -1.29398 | 0.24327 | 15.9989 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 1.993295 |

| | | | | | |
|---|---|---|---|---|---|
| Null Hypothesis: D(GDSR) has a unit root | | | | | |
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample (adjusted): 1991 2023 | | | | | |
| Included observations: 33 after adjustments | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -15.0892 | -2.45793 | 0.16289 | 7.63730 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |

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|---|---|---|---|---|---|
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 1.993626 |

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|---|---|---|---|---|---|
| Null Hypothesis: LASI has a unit root | | | | | |
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample: 1990 2023 | | | | | |
| Included observations: 34 | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -3.17725 | -1.23172 | 0.38767 | 28.0232 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 0.084376 |

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|---|---|---|---|---|---|
| Null Hypothesis: D(LASI) has a unit root | | | | | |
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample (adjusted): 1991 2023 | | | | | |
| Included observations: 33 after adjustments | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -15.6793 | -2.74315 | 0.17495 | 6.14300 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |

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|---|---|
| HAC corrected variance (Spectral GLS-detrended AR) | 0.086670 |

| | | | | | |
|---|---|---|---|---|---|
| Null Hypothesis: LEXR has a unit root | | | | | |
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample: 1990 2023 | | | | | |
| Included observations: 34 | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -5.91141 | -1.71890 | 0.29078 | 15.4146 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 0.062597 |

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|---|---|---|---|---|---|
| Null Hypothesis: D(LEXR) has a unit root | | | | | |
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample (adjusted): 1991 2023 | | | | | |
| Included observations: 33 after adjustments | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -15.9900 | -2.77529 | 0.17356 | 6.00508 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 0.072877 |

| Null Hypothesis: LMCAPE has a unit root | | | | | |
|---|---|---|---|---|---|
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample: 1990 2023 | | | | | |
| Included observations: 34 | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -3.59242 | -1.28028 | 0.35639 | 24.3784 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 0.083851 |

| Null Hypothesis: D(LMCAPE) has a unit root | | | | | |
|---|---|---|---|---|---|
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample (adjusted): 1991 2023 | | | | | |
| Included observations: 33 after adjustments | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -15.9670 | -2.79401 | 0.17499 | 5.89227 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 0.087835 |

| Null Hypothesis: LNLE has a unit root |
|---|
| Exogenous: Constant, Linear Trend |

| | | | | | |
|---|---|---|---|---|---|
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample: 1990 2023 | | | | | |
| Included observations: 34 | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -1.02414 | -0.55377 | 0.54072 | 58.9315 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 0.001722 |

| | | | | | |
|---|---|---|---|---|---|
| Null Hypothesis: D(LNLE) has a unit root | | | | | |
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample (adjusted): 1991 2023 | | | | | |
| Included observations: 33 after adjustments | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -15.3464 | -2.73204 | 0.17802 | 6.15931 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 0.001255 |

| | | | |
|---|---|---|---|
| Null Hypothesis: LTS has a unit root | | | |
| Exogenous: Constant, Linear Trend | | | |
| Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | |
| Sample: 1990 2023 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Included observations: 34 | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -8.21258 | -1.98375 | 0.24155 | 11.2198 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 0.053182 |

| | | | | | |
|---|---|---|---|---|---|
| Null Hypothesis: D(LTS) has a unit root | | | | | |
| Exogenous: Constant, Linear Trend | | | | | |
| Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=8) | | | | | |
| Sample (adjusted): 1991 2023 | | | | | |
| Included observations: 33 after adjustments | | | | | |
| | | MZa | MZt | MSB | MPT |
| Ng-Perron test statistics | | -13.8975 | -2.49193 | 0.17931 | 7.35498 |
| Asymptotic critical values*: | 1% | -23.8000 | -3.42000 | 0.14300 | 4.03000 |
| | 5% | -17.3000 | -2.91000 | 0.16800 | 5.48000 |
| | 10% | -14.2000 | -2.62000 | 0.18500 | 6.67000 |
| *Ng-Perron (2001, Table 1) | | | | | |
| HAC corrected variance (Spectral GLS-detrended AR) | | | | | 0.016263 |

| | | |
|---|---|---|
| Dependent Variable: GDPGR | | |
| Method: Quantile Regression (tau = 0.25) | | |
| Date: 05/03/26 Time: 08:59 | | |
| Sample: 1990 2023 | | |
| Included observations: 34 | | |
| Huber Sandwich Standard Errors & Covariance | | |

Sparsity method: Kernel (Epanechnikov) using residuals

Bandwidth method: Hall-Sheather, bw=0.20771

Estimation successfully identifies unique optimal solution

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -122.5091 | 92.09372 | -1.330265 | 0.1946 |
| GDSR | 0.074290 | 0.431682 | 0.172093 | 0.8646 |
| LTS | -0.415721 | 6.462833 | -0.064325 | 0.9492 |
| LASI | 3.462521 | 8.534355 | 0.405716 | 0.6881 |
| LMCAPE | -0.498264 | 9.891240 | -0.050374 | 0.9602 |
| LNLE | 19.79980 | 10.54412 | 1.877805 | 0.0712 |
| LEXR | -1.182263 | 1.896213 | -0.623486 | 0.5382 |
| Pseudo R-squared | 0.288290 | Mean dependent var | | 4.245752 |
| Adjusted R-squared | 0.130132 | S.D. dependent var | | 3.905547 |
| S.E. of regression | 5.587817 | Objective | | 28.97584 |
| Quantile dependent var | 1.922757 | Restr. objective | | 40.71297 |
| Sparsity | 7.708209 | Quasi-LR statistic | | 16.24191 |
| Prob(Quasi-LR stat) | 0.012513 | | | |

Dependent Variable: GDPGR

Method: Quantile Regression (Median)

Date: 05/03/26 Time: 09:00

Sample: 1990 2023

Included observations: 34

Huber Sandwich Standard Errors & Covariance

Sparsity method: Kernel (Epanechnikov) using residuals

Bandwidth method: Hall-Sheather, bw=0.2999

Estimation successfully identifies unique optimal solution

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -58.97785 | 49.30035 | -1.196297 | 0.2420 |
| GDSR | 0.128075 | 0.413597 | 0.309662 | 0.7592 |
| LTS | -4.376742 | 4.186177 | -1.045523 | 0.3051 |

| | | | | |
|---|---|---|---|---|
| LASI | -3.044057 | 4.917327 | -0.619047 | 0.5411 |
| LMCAPE | 5.275082 | 5.900580 | 0.893994 | 0.3792 |
| LNLE | 14.65955 | 8.799660 | 1.665923 | 0.1073 |
| LEXR | 1.507178 | 2.340862 | 0.643856 | 0.5251 |
| Pseudo R-squared | 0.299710 | Mean dependent var | | 4.245752 |
| Adjusted R-squared | 0.144090 | S.D. dependent var | | 3.905547 |
| S.E. of regression | 4.013368 | Objective | | 36.06915 |
| Quantile dependent var | 4.195924 | Restr. objective | | 51.50600 |
| Sparsity | 7.792623 | Quasi-LR statistic | | 15.84766 |
| Prob (Quasi-LR stat) | 0.014595 | | | |

| | | | | |
|---|---|---|---|---|
| Dependent Variable: GDPGR | | | | |
| Method: Quantile Regression (tau = 0.75) | | | | |
| Date: 05/03/26 Time: 09:00 | | | | |
| Sample: 1990 2023 | | | | |
| Included observations: 34 | | | | |
| Huber Sandwich Standard Errors & Covariance | | | | |
| Sparsity method: Kernel (Epanechnikov) using residuals | | | | |
| Bandwidth method: Hall-Sheather, bw=0.20771 | | | | |
| Estimation successfully identifies unique optimal solution | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | -71.09326 | 40.29140 | -1.764477 | 0.0890 |
| GDSR | 0.566090 | 0.507263 | 1.115968 | 0.2743 |
| LTS | -5.352815 | 3.441689 | -1.555287 | 0.1315 |
| LASI | -3.363003 | 4.408916 | -0.762773 | 0.4522 |
| LMCAPE | 4.382009 | 5.002146 | 0.876026 | 0.3887 |
| LNLE | 17.95729 | 6.747433 | 2.661351 | 0.0129 |
| LEXR | 3.517494 | 1.895640 | 1.855570 | 0.0745 |
| Pseudo R-squared | 0.206109 | Mean dependent var | | 4.245752 |
| Adjusted R-squared | 0.029688 | S.D. dependent var | | 3.905547 |

| | | | |
|---|---|---|---|
| S.E. of regression | 4.210900 | Objective | 32.06438 |
| Quantile dependent var | 6.591130 | Restr. objective | 40.38887 |
| Sparsity | 7.065406 | Quasi-LR statistic | 12.56751 |
| Prob (Quasi-LR stat) | 0.050442 | | |

| Years | **GDPGR** | **GDSR** | **LASI** | **LMCAPE** | **LEXR** | **LNLE** | **LTS** |
|---|---|---|---|---|---|---|---|
| 1990 | 11.77689 | 5.994457 | 6.241834 | 3.101652 | 2.084216 | 4.875197 | 3.389462 |
| 1991 | 0.358353 | 6.395658 | 6.663133 | 3.522950 | 2.293493 | 4.955827 | 3.630721 |
| 1992 | 4.631193 | 6.083335 | 7.009951 | 3.869768 | 2.850615 | 5.030438 | 4.009513 |
| 1993 | -2.035119 | 6.763411 | 7.342002 | 4.201820 | 3.094011 | 5.159055 | 4.443004 |
| 1994 | -1.814924 | 6.273594 | 7.698483 | 4.558300 | 3.090861 | 5.176150 | 4.709260 |
| 1995 | -0.072665 | 3.499422 | 8.535465 | 5.395283 | 3.086270 | 5.198497 | 4.686658 |
| 1996 | 4.195924 | 3.291754 | 8.852536 | 5.712354 | 3.085775 | 5.209486 | 4.901564 |
| 1997 | 2.937099 | 4.020376 | 8.770361 | 5.630179 | 3.085849 | 5.204007 | 5.179815 |
| 1998 | 2.581254 | 4.163550 | 8.643420 | 5.548687 | 3.085847 | 5.225747 | 5.298667 |
| 1999 | 0.584127 | 5.064749 | 8.569102 | 5.683920 | 4.525457 | 5.278115 | 5.626433 |
| 2000 | 5.015935 | 5.453837 | 9.000976 | 6.144312 | 4.622001 | 5.278115 | 5.953737 |
| 2001 | 5.917685 | 5.926842 | 9.302290 | 6.474584 | 4.711611 | 5.267858 | 6.190418 |
| 2002 | 15.32916 | 5.147994 | 9.404072 | 6.618338 | 4.792298 | 5.273000 | 6.383659 |
| 2003 | 7.347195 | 4.836918 | 9.909914 | 7.189091 | 4.861535 | 5.298317 | 6.485764 |
| 2004 | 9.250558 | 4.400323 | 10.07931 | 7.563168 | 4.889507 | 5.332719 | 6.681507 |
| 2005 | 6.438517 | 5.695720 | 10.08938 | 7.833399 | 4.877289 | 5.365976 | 7.183081 |
| 2006 | 6.059428 | 5.727166 | 10.40998 | 8.349280 | 4.857108 | 5.308268 | 7.461433 |
| 2007 | 6.591130 | 7.748429 | 10.96803 | 9.228209 | 4.834758 | 5.356586 | 7.896121 |
| 2008 | 6.764473 | 10.63174 | 10.35618 | 8.847569 | 4.775475 | 5.361292 | 8.354164 |
| 2009 | 8.036925 | 13.13345 | 9.944014 | 8.515069 | 5.003141 | 5.375278 | 8.649622 |
| 2010 | 8.005656 | 10.71108 | 10.11741 | 8.976357 | 5.012617 | 5.379897 | 8.689695 |
| 2011 | 5.307924 | 10.24383 | 9.939368 | 8.784558 | 5.036059 | 5.303305 | 8.783655 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2012 | 4.230061 | 11.04853 | 10.24277 | 9.102137 | 5.059425 | 5.288267 | 8.989842 |
| 2013 | 6.671335 | 11.85466 | 10.62932 | 9.489940 | 5.058229 | 5.288267 | 9.169878 |
| 2014 | 6.309719 | 12.70465 | 10.45326 | 9.348158 | 5.066087 | 5.278115 | 9.345884 |
| 2015 | 2.652693 | 12.35994 | 10.26264 | 9.195289 | 5.259786 | 5.247024 | 9.372792 |
| 2016 | -1.616869 | 13.68187 | 10.19894 | 9.132046 | 5.535332 | 5.135798 | 9.549255 |
| 2017 | 0.805887 | 12.58897 | 10.55172 | 9.518521 | 5.722899 | 5.117994 | 9.579462 |
| 2018 | 1.922757 | 11.27878 | 10.35553 | 9.369113 | 5.723859 | 5.099866 | 9.585994 |
| 2019 | 2.208429 | 11.59935 | 10.19773 | 9.470285 | 5.726590 | 5.099866 | 9.734666 |
| 2020 | -1.794253 | 13.51152 | 10.60338 | 9.954977 | 5.882795 | 5.099866 | 9.944718 |
| 2021 | 3.647187 | 14.53314 | 10.66234 | 10.01220 | 5.994340 | 5.099866 | 10.14993 |
| 2022 | 3.251681 | 14.94330 | 10.84449 | 10.23692 | 6.054390 | 5.099866 | 10.31692 |
| 2023 | 2.860215 | 20.20936 | 11.22222 | 10.61931 | 6.469551 | 5.099866 | 10.76587 |