

EXTERNAL DEBT AND CAPITAL FORMATION IN NIGERIA: NEW INSIGHT FROM THE QUANTILE AUTOREGRESSIVE DISTRIBUTED LAG (QARDL) MODEL

YUSUF SHAMSUDDEEN NADABO¹

*¹Department of Economics, Umaru Musa Yar'adua University, Katsina
nadabojby@gmail.com/07039399510
ORCID iD: 0000-0001-5023-6079*

MUHAMMAD MUSTAPHA ABDULLAHI²

*²Department of Economics, Umaru Musa Yar'adua University, Katsina
almustapher12@gmail.com/08033309666*

ABDULLAHI MURTALA KWARAH³

*³Department of Economics, Umaru Musa Yar'adua University, Katsina
qurau30@gmail.com/08039704405*

HUSSAINI USMAN MALAMI⁴

*⁴Department of Economics, Usmanu Danfodio University, Sokoto
humalami@yahoo.com/08069759061*

ABSTRACT

The study is on the impact of external debt on capital formation in Nigeria from 1981 to 2022 using the Quantile Autoregressive Distributed Lag (QARDL) model. The findings indicate that external debt has a notable adverse effect on capital formation in Nigeria, suggesting that increased levels of external debt impede capital formation by disrupting investment choices and distorting economic growth prospects. Additionally, the study reveals a positive relationship between gross domestic product and gross national savings on capital formation. Granger causality tests support the significance of external debt and national savings as key predictors of capital formation in Nigeria. The study recommends that policies should be geared toward increasing transparency in debt management, promoting domestic savings, diversifying the economy, enhancing export capacity, improving financial sector regulation, fostering public private partnerships, and monitoring debt sustainability indicators. Implementing these recommendations can enhance capital formation, stimulate economic growth, and reduce reliance on external borrowing in Nigeria.

Keywords: Capital formation, economic growth, external debt, savings, investment, Nigeria.

JEL. Classifications: C13, E22, F34, H54, H63

1. INTRODUCTION

Capital formation is crucial for the economic growth and development of a nation as it enhances the economy's capacity to produce more goods and services, creates job opportunities, and boosts export capacity (Fumey, Bekoe, & Imoru, 2022; Kolawole, 2024). According to Hernandez-Cata (1988), for significant economic growth to occur, capital formation should account for at least 27% of GDP. Savings play a key role in capital formation by providing resources for necessary investments, but developing economies like Nigeria often face challenges with inadequate capital formation due to a vicious cycle of low productivity, low income, and low savings (Kibona, & Kirama, 2024). Governments in such capital-starved economies prioritize reducing poverty, improving income distribution, and increasing employment levels to foster economic development (Osevwe-Akpokerere, & Onatuyeh, 2024).

To bridge the investment gap, foreign borrowing is often necessary. The dual-gap model, as proposed by Chenery and Strout in 1966, suggests that foreign resources can help address the dual gaps in the economy. This model assumes that all foreign borrowing is directed towards investment expenditures, enabling the economy to finance higher investment levels that exceed what can be funded by domestic resources alone.

External debt plays a vital role in financing the economic expansion of many developing countries, supplementing their limited domestic savings (Osevwe-Akpokerere, & Onatuyeh, 2024; Nadabo, & Maigari, 2021). It is also believed that an increased stock of capital leads to improved economic performance, which in turn spurs further savings (Sachs, 2002). Once savings reach a certain threshold, the capital will be robust enough to support ongoing capital formation process, driving self-sustaining economic growth (Abdullahi, Bakar, & Hassan, 2016). However, if external debts are not allocated to sustainable development projects, it can hinder economic progress, leading to debt overhang, and financial instability (Nadabo, 2023). Many developing countries borrow without fully considering the consequences attached to it. While external borrowing can help bridge savings gaps, it often leads to servicing significant debt at high interest rates and potential future tax hikes. This could deter foreign investors and reduce savings needed to repay the debt. High debt servicing can also limit resources for infrastructure and human capital development, negatively impacting economic growth (Mohammed, & Jibril, 2023; Fumey, Bekoe, & Imoru, 2022).

From 2000 to 2023, Nigeria experienced significant fluctuations in its public external debt stock. The trend reveals a notable increase over the years, punctuated by periods of relatively stable or declining debt levels. Between 2000 and 2006, Nigeria's public external debt stock saw a modest increase from \$28.27 billion to \$35.99 billion. However, there was a sharp decline in 2006 to \$3.54 billion, likely due to debt relief grant and improved economic management. Following this decline, there was a gradual uptick in debt levels, reaching \$4.57 billion in 2010 and \$6.53 billion in 2012. The subsequent years saw a more pronounced escalation, with debt reaching \$42.49 billion by 2023. This increase suggests a pattern of borrowing to finance developmental projects or to address economic challenges (World Bank, 2024).

Notably, there were fluctuations in debt levels between 2014 and 2023, with some years witnessing more substantial increases than others. For instance, the debt stock nearly doubled from 2014 to 2023, indicating a significant acceleration in borrowing during this period. The upward trajectory in Nigeria's public external debt stock underscores the importance of prudent debt management and the need for sustainable financing strategies.

While debt can be a tool for economic development, it must be managed carefully to avoid over indebtedness and debt distress in such a manner that it contribute positively to a sustainable improvement in capital formation. It is in view of the forgoing therefore it becomes pertinent to investigate the nexus between external debt and capital formation in Nigeria. Hence, policymakers should prioritize transparency, accountability, and fiscal discipline to ensure that borrowed funds are effectively utilized and contribute to long-term economic growth and stability.

Therefore, the objective of this study is to examine the nexus between external debt and capital formation in Nigeria. After this introduction, the rest of the paper is structured as follows: Section 2 of this study reviews theoretical and empirical literature which is followed by methodology and data description in section 3. Section 4 deals with the discussion of empirical results. While section 5 conclude the study and provide policy implications and suggestions.

2. LITERATURE REVIEW

Concept of Capital Formation

Capital formation is a key concept in macroeconomics that involves accumulating tangible assets to boost a country's production capacity and income generation. Investing in new assets for future economic growth is vital for a nation's economic well-being. It plays a crucial role in increasing a country's income, driving economic development. Capital accumulation fuels growth in manufacturing and services, leading to higher production levels and economic prosperity. (Sachs, 2002; Nadabo, 2023).

Concept of External Debt

Closely linked to capital formation the concept of external debt is defined as the total amount of money a country owes to foreign creditors, including loans, bonds, and other financial instruments. It is a key indicator of a country's financial health and can affect its ability to access credit, make debt payments, and maintain economic stability. High levels of external debt can pose challenges for countries in managing their finances and make them more susceptible to economic shocks or global financial changes (Ambi, et al. 2023).

2.1 Theoretical literature

The "dual gap" theory, first proposed by Harrod-Domar (1946) and further elaborated by Chenery and Strout (1966), has long been a cornerstone for development economists. This theory serves to justify the necessity of external borrowing in developing countries to bridge the gap between savings and investment. It posits that developing economies must borrow externally to meet their economic growth goals due to insufficient domestic savings to fund their investments.

2.2 Empirical Literature

Empirical research on the relationship between external debt and capital formation has yielded mixed results. For example, Bai, et al. (2024) examined the impact of multilateral lending on capital accumulation using data from 175 countries between 1970 and 2017, employing the GMM estimation technique. Their findings suggest a positive influence of multilateral lending on capital accumulation. Similarly, Omodero (2019) analyzed the effect of external financing on public capital investment in Nigeria using time-series data from 1996 to 2018 and the OLS method. The results indicate that external debt has a significant negative impact on capital formation, while debt servicing costs have a positive and highly significant effect. Thilanka and Ranjith (2018) investigated the impact of public debt on private investment in Sri Lanka from 1978 to 2015 using the Vector Error Correction Model (VECM). Their findings suggest that public debt crowds out private investment during the study period.

In a study on the relationship between government borrowing and private investment in Kenya, Lidiema (2018) analyzed a time-series dataset from 1975 to 2014 using the ARDL estimation technique. The results indicate that domestic debt has a negative long-term impact on private investment. A study conducted by Ndemange (2018) in Kenya examined the impact of external debt servicing on capital formation and economic growth using data from 1984 to 2014. The study found that external debt servicing has a significant negative effect on capital formation, which in turn affects economic growth. Abdullahi et al. (2016) studied the effect of external debt on capital formation in Nigeria from 1980 to 2013 using the ARDL method. The results showed that external debt servicing has a positive impact on capital formation. Adamgbo and Igbasra (2016) investigated the effect of external debt on capital accumulation in Nigeria from 1981 to 2010 using the Johansen cointegration estimation technique. The study found a negative relationship between external debt servicing and capital accumulation in Nigeria.

In a study conducted by Fumey, Bekoe, and Imru (2022) using time series data from 1980 to 2019 and applied an ARDL model to examine the influence of external debt servicing on capital formation in Ghana. The study revealed that external debt servicing had a negative impact in both the short and long term. Joy and Panda (2020), established that strategic external borrowing to fund public development initiatives is crucial for a country's economic advancement. However, borrowing for unproductive projects can lead to a debt crisis for the nation. Serin and Demir (2023) investigates the impact of public debt and public investment on private investment in Turkey from 1975 to 2020 using the ARDL method. Results from the study indicate that public investment, domestic public debt stock, and external debt service have a crowding-out effect on private investment. Conversely, the public external debt stock has a crowding-in effect on private sector investments. Dinga, Fonchamnyo, & Afumbom (2024), examined the effects of external debt and domestic capital formation on economic development in 35 Sub-Saharan African (SSA) countries from 1995 to 2018. Using the Dynamic Common Correlation Effects (DCCE) and Driscoll and Kraay fixed-effect techniques, the study found that domestic investment has a positive influence on external debt.

The foregoing indicates that the empirical findings on the external debt and capital formation nexus are not yet harmonised. Apparently, these mixed findings could be explained by the differences in estimation techniques, the country/region under study, the timeframe of the analysis as well as the adopted measures of external debt, and capital formation. While most studies employed the ARDL technique, this study adopts the quantile ARDL (QARDL) technique to examine the impact of external debt on capital formation in Nigeria.

3. METHODOLOGY

3.1 The Empirical Model

The empirical model, based on the dual gap model by Chenery and Straut (1966) and formulated within the national income identity by Root (1978), illustrates the rationale for external borrowing to supplement internal savings for investment in the economy. This relationship can be expressed as in equation 1:

$$M_t - X_t = I_t - S_t \quad (1)$$

Where: M_t denotes Imports at time, t ; X_t denotes Exports at time t ; I_t represents Investment at time t , and S_t reflects Savings at time t . Equation (1) implies that the foreign exchange gap is equal to the savings gap and total domestic savings is the sum of private savings and government savings, hence it can be represented as in equation 2:

$$S_t = S_t^P + S_t^G \quad (2)$$

Where: S_t^P is domestic private savings, and S_t^G is government savings. Note that total domestic savings may be reduced by government debt service payments which are expressed as in equation 3:

$$S_t^G = TR_t - DS_t \quad (3)$$

Where: DS_t is debt servicing in period t , and TR_t is government total revenue in period t . Therefore, Equation (3) indicates that total savings in the economy is a function of debt service payments, therefore can be expressed as in equation 4:

$$S_t = f(DS_{t-1}) \text{ or } S_{t+1} = f(DS) \quad (4)$$

Where: DS_{t-1} is a one period lag of debt servicing, and S_{t+1} is one period lead of debt servicing.

3.2 Model Specification

The empirical model for the effect of external debt on capital formation is expressed as in equation 5:

$$\ln CFM_t = \beta_0 + \beta_1 \ln EXD_t + \beta_2 \ln GNS_t + \beta_3 ECR_t + \beta_4 \ln GDP_t + \mu_t \quad (5)$$

where: CFM is gross capital formation, EXD is total external debt stock, GNS is Gross national savings, ECR is the exchange rate, GDP is gross domestic product growth rate, β_0 is the intercept, $\beta_1 - \beta_5$ are the parameters to be determined, and μ is stochastic error term.

Quantile Autoregressive Distributed Lag (QARDL)

This study examines location-based (quantile) asymmetries in the relationship between external debt and capital formation in Nigeria, using the QARDL model developed by Cho, Kim, & Shin, (2015). By employing the QARDL methodology, the study evaluates the consistency of relationships across different quantiles, providing a more adaptable econometric framework for analyzing the relationship between external debt and capital formation (Sadiq, Nosheen, & Naz, 2023; Wu et al., 2022). In contrast to linear ARDL models, the QARDL model holds the advantage of introducing potential asymmetries in how capital formation reacts to changes in external debt across different quantiles.

According to Shahbaz et al. (2018), methodologically, the QARDL model surpasses linear models due to its ability to account for locational asymmetry and capture the long-term relationship between external debt and capital formation, as well as short-term dynamics across different quantiles of the conditional distribution. This model can identify quantile-varying cointegration coefficients and variations induced by shocks, making it a data-driven approach that outperforms traditional techniques like the NARDL model. In the context of Nigeria, QARDL is preferred for accurately modeling the nonlinear and asymmetric linkages between external debt and capital formation. The technique is used to analyze both short-run and long-run relationships between the variables. To begin with, a traditional ARDL model is specified, as shown in Equation (6).

$$\begin{aligned} \Delta CFM_t = & \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta CFM_{t-i} + \sum_{i=0}^q \beta_{2i} \Delta EXD_{t-i} + \sum_{i=0}^q \beta_{3i} \Delta GNS_{t-i} + \\ & \sum_{i=0}^q \beta_{4i} \Delta ECR_{t-i} + \sum_{i=0}^q \beta_{5i} \Delta GDP_{t-i} + \phi_1 CFM_{t-1} + \phi_2 EXD_{t-1} + \phi_3 GNS_{t-1} + \phi_4 ECR_{t-1} \\ & + \phi_5 GDP_{t-1} + \varepsilon_{1t} \end{aligned} \quad (6)$$

In the above equations, CFM is gross capital formation, EXD is total external debt stock, GNS is Gross national savings, ECR is the exchange rate, and GDP is gross domestic product growth rate. The term with ϕ s corresponds to the long-run relationship, while the terms with summation signs represent the short-run. ϕ is the long run and β is the short-run coefficients respectively.

Following Cho et al. (2015), Equation (6) is extended into the basic QARDL (p, q) model to accommodate variations across quantiles as shown in Equation (7):

$$QCFM_t = \beta(\gamma) + \sum_{i=1}^p \beta_1(\gamma) CFM_{t=1} + \sum_{i=0}^{q1} \partial_2(\gamma) EXD_{t=1} + \sum_{i=0}^{q2} \lambda_3(\gamma) GNS_{t=1} +$$

$$\sum_{i=0}^{q3} \varphi_4 ECR_{t=1} + \sum_{i=0}^{q4} \rho_5 GDP_{t=1} + \varepsilon_t(\gamma) \quad (7)$$

Here, $\varepsilon_t(\gamma)$ equals $CFM_t - QCFM_t [\gamma / F_{t-1}]$ and $QCFM_t [\gamma / F_{t-1}]$ refers to the γ th quantile of $LCFM_t$ conditional on the information set F_{t-1}

Equation (8) is then specified to analyze the QARDL

$$\begin{aligned} QLCFM_t = & \beta(\gamma) + \sum_{i=1}^{qi-1} \phi_{LCFM}(\gamma) \Delta LCFM_{t-1} + \tau_{LCFM}(\gamma) LCFM_t \\ & + \sum_{i=1}^{qi-1} \partial_{LEXD}(\gamma) \Delta LEXD_{t-1} + \tau_{LEXD}(\gamma) LEXD_t + \sum_{i=1}^{qi-1} \lambda_{GNS}(\gamma) \Delta GNS_{t-1} \\ & + \tau_{GNS}(\gamma) GNS_t + \sum_{i=1}^{qi-1} \rho_{ECR}(\gamma) \Delta ECR_{t-1} + \tau_{ECR}(\gamma) ECR_t \\ & + \sum_{i=1}^{qi-1} \psi_{LGDP}(\gamma) \Delta LGDP_{t-1} + \tau_{LGDP}(\gamma) LGDP_t + \varepsilon_t(\gamma) \end{aligned} \quad (8)$$

The parameters in Equation (8) capture the short-run effects of the relationship between capital formation and the regressors. The long-run effects are obtained by reworking Equation (8) as follows:

$$QLCFM_t = \mu(\gamma) + X_t \alpha + M_t(\gamma) \quad (9)$$

Where X is the vector of regressors (EXD, GNS, ECR, GDP).

QARDL-ECM model, which was estimated, is specified thus:

$$\begin{aligned} Q\Delta LCFM_t = & \alpha(\gamma) + \beta_1 LCFM_{t-1} - \beta_{LEXD}(\gamma) LEXD_{t-1} - \beta_{GNS}(\gamma) GNS_{t-1} \\ & - \beta_{LGDP}(\gamma) LGDP_{t-1} + \sum_{i=1}^{p-1} \beta_1(\gamma) CFM_{t-1} + \sum_{i=0}^{qi-1} \partial_2(\gamma) EXD_{t-1} \\ & + \sum_{i=0}^{qi-1} \lambda_3(\gamma) GNS_{t-1} + \sum_{i=0}^{qi-1} \varphi_4 RIR_{t-1} + \sum_{i=0}^{qi-1} \rho_5 GDP_{t-1} + \theta_1 ECT_{t-1} \\ & + \varepsilon_t(\gamma) \end{aligned} \quad (10)$$

In the final stage of the empirical analysis, Granger causality testing is conducted to assess if external debt can enhance Nigeria's capital formation. This method is based on the concept that past events can influence future outcomes (Odhiambo, 2009). Granger causality testing determines if one variable, X_t , significantly impacts the forecasting of another variable, Y_t . The process involves testing the null hypothesis of no Granger causality from X_t to Y_t and vice versa by estimating the following equations:

$$y_t = \alpha_{10} + \sum_{i=1}^n \alpha_{11} y_{t-1} + \sum_{i=1}^n \alpha_{12} x_{t-1} + \varepsilon_t \tag{11}$$

$$x_t = \alpha_{20} + \sum_{i=1}^n \alpha_{21} x_{t-1} + \sum_{i=1}^n \alpha_{22} y_{t-1} + \mu_t \tag{12}$$

The null hypothesis that X_t does not Granger cause Y_t is rejected if α_{12} shows joint significance. Similarly, the null hypothesis that Y_t does not Granger cause X_t is rejected if α_{22} shows joint significance (Granger, 1969).

Data Source and Measurement of Variables

This study utilized secondary data. The data included annual time series data from 1981-2022 for variables such as EXD is the external debt, GNS is gross national savings, ECR is exchange rate, GDP is the gross domestic product and CFM is the capital formation all are source from World Development Indicators (World Bank, 2024).

Capital Formation, CFM: Gross fixed capital formation (GFCF) is a macroeconomic concept that measures the total value of physical assets (such as machinery, equipment, and buildings) that are produced for use in the production of goods and services. External debt (EXD) refers to the total amount of money a country owes to foreign creditors. This debt can be incurred through various means, including loans from foreign governments, international financial institutions such as the World Bank or the International Monetary Fund (IMF), or through the issuance of bonds in international markets (World Bank, 2024).

The exchange rate (ECR) is the rate at which one currency can be exchanged for another, influenced by factors like supply and demand, interest rates, inflation, and geopolitical events. Fluctuating constantly, exchange rates are vital in international trade and investment. Gross Domestic Product (GDP) is a key measure of a country's economic output, representing the total value of all goods and services produced within its borders over a specific period, usually annually or quarterly. Gross national savings (GNS) is the total amount of savings generated within a country during a specific period, typically a year. It represents the portion of national income that is not spent by households, businesses, or the government, but rather set aside for future use (World Bank, 2024).

4. Results and Discussions

Table 1 Descriptive Statistics

Varia	Mean	Median	Max	Min	Std. Dev	Skew.	Kurt.	JB	Prob.
LCFM	72800	54800	11200	40100	15500	0.982	4.234	9.385	0.006
LEXD	88.344	117.734	407.901	0.780	95.693	0.881	2.776	4.404	0.209
ECR	18.031	11.865	64.763	6.298	15.986	1.823	5.173	28.803	0.000
LGDP	18700	11100	68500	37700	18000	0.886	1.937	6.334	0.087
GNS	2.518	2.683	2.817	2.391	0.053	0.163	1.837	2.557	0.286

Source: authors' computation (2024)

Table 1 summarizes statistics for capital formation, external debt, exchange rate, gross domestic product, and gross national savings. It shows average values, variation around the mean, and normality tests for each variable. Capital formation and GDP have the most variation, while gross national savings has the least.

Table 2 Correlation Matrix

Variables	LCFM	LEXD	ECR	LGDP	GNS
LCFM	1				
LEXD	0.850	1			
ECR	0.865	0.857	1		
LGDP	0.848	0.787	0.881	1	
GNS	0.385	0.799	0.576	0.805	1

Source: authors' computation (2024)

Result from Table 2 above it indicates that capital formation is strongly and positively correlated with external debt, exchange rate, and gross domestic product, suggesting that capital formation tends to increase alongside these variables of interest. In contrast, capital formation has a weak positively correlation with gross national saving, indicating a less strong relationship.

Table 3 Unit Root Test Results

Variables	Level		First Difference		Order of integration
	ADF	PP	ADF	PP	
LCFM	-2.332	-2.677	-3.441**	-3.199**	I(1)
LEXD	-1.125	-1.167	5.377***	-7.288***	I(1)
ECR	-2.792	-2.678	7.066***	11.850***	I(1)
LGDP	3.211**	-2.277	-	-	I(0)
GNS	-1.856	-1.874	-6.105***	-6.138***	I(1)

Source: Authors' compilation (2024)

Note: Schwarz Information Criterion (SIC) was used to select the optimum lag length in the ADF test. ***, ** and * indicated statistically significant at 1%, 5% and 10% respectively.

To prevent spurious regression results caused by non-stationary series, it is essential to conduct unit root testing on the variables. This study includes the Augmented Dickey Fuller (ADF) and Phillip Perron (PP) unit root tests, with the results presented in Table 3. The findings indicate that all variables, except LGDP, exhibit a unit root, suggesting that only LGDP is stationary at level I(0). The other variables become stationary after first differencing, indicating they are I(1).

The presence of a mix of stationary and non-stationary variables underscores the need for employing the QARDL approach. QARDL, being a variant of the traditional ARDL method, can handle a combination of I(0) and I(1) variables. The short-run and long-run QARDL estimates of the impact of external debt and other factors on capital formation in Nigeria are presented in Table 4.

Table 4 QARDL Estimation Results

Quantiles	ECM	INTERCEPT	LEXD	ECR	LGDP	GNS
0.1	-0.073*					
SR		-0.188	-0.088*	-0.020*	0.209*	1.811*
LR		-22.312*	0.287*	-0.007*	0.998*	8.766*
0.2	-0.178*					
SR		-0.076	-0.265*	-0.003*	0.433*	2.076*
LR		-20.556*	0.278*	-0.008*	1.055*	7.437*
0.3	-0.092*					
SR		0.040	-0.400*	-0.004*	0.388*	2.992*

LR		-19.664*	0.289*	-0.009*	1.074*	6.873*
0.4	-0.156*					
SR		0.019	0.167*	-0.004*	0.289*	2.688*
LR		-32.533*	0.234*	-0.007*	1.688*	6.137*
0.5	-0.164*					
SR		0.066	-0.184*	-0.003*	0.347*	2.771*
LR		-31.034*	0.245*	-0.005*	1.761*	5.822*
0.6	-0.179*					
SR		0.078	-0.291*	-0.005*	0.329*	2.982*
LR		-33.671*	0.231*	-0.008*	1.988*	4.607*
0.7	-0.188*					
SR		0.094	-0.177*	-0.004*	0.393*	2.344*
LR		-32.880*	0.188*	-0.009*	1.871*	5.712*
0.8	-0.179*					
SR		0.079	-0.189*	-0.003*	0.355	2.447*
LR		-5.889	0.288*	-0.015*	0.898*	2.339*
0.9	-0.223*					
SR		0.108*	-0.019*	-0.003*	0.229	2.310*
LR		-4.190	0.233*	-0.010*	0.777*	2.488*

* Indicates significance at 5%, SR is short-run, LR is long-run.

Source: authors' computation (2024)

The quantile estimates of the error correction term (ECM coefficient) show a speed of adjustment of 7.3% at the 0.1 quantile, increasing to 16.4% at the 0.5 quantile, and further rising to 22.3% at the 0.9 quantile. Despite varying across quantiles, the ECM coefficients consistently remain significantly negative, indicating a convergence of the model back to long-run equilibrium after short-run disequilibrium, confirming cointegration among the variables. The quantile estimates of external debt consistently show negative effects in both the short and long run, highlighting the adverse impact of external debt on capital formation in Nigeria. This negative influence stems from the destabilization of investment decisions for businesses, savers, and borrowers, leading to unreliable forecasts of returns on financial assets and investment projects, ultimately hindering economic growth prospects and distorting capital formation performance. This finding aligns with previous studies by Abdullahi, Bakar, & Hassan (2016) and Prakash & Panigrahi (2024), which suggest that countries with higher debt levels tend to experience weaker growth. Additionally, the negative relationship between external debt and capital formation is indirectly supported by Adamu, Auwal, & Bala, (2023).

In the long-run, the negative impact of external debt gradually increases from lower to higher quantiles until a decline is observed beyond the 0.8 quantile. The adverse effect on capital formation is more pronounced when the economy is already in a relatively strong position. Regarding the control variables, there is a statistically significant negative effect on both short-run and long-run capital formation. The short-run effect shows an escalation of negativity between the 0.1 and 0.2 quantiles, followed by a decrease between the 0.2 and 0.4 quantiles, and a consistent negative effect beyond the 0.4 quantile. In the long-run, there is a gradual decrease in the positive impact of the exchange rate between the 0.1 and 0.7 quantiles, followed by an increase and then a further decline. This suggests that while currency devaluation may initially have a depressing effect, it ultimately stimulates capital formation by promoting exports. Devaluing a currency can stimulate domestic investment and production, leading to increased net exports and improved capital formation. (Osuka, Otiwu, & Elizabeth, 2024). GDP has a positive impact on capital formation in both the short run and the long run, as supported by economic theory (Chow, 2017; Nadabo, 2023). The short-run effect is not statistically

significant beyond the 0.7 quantile, while the long-run effect is significant across all quantiles in the long-run. Furthermore, the long-run coefficients are consistently larger than the short-run coefficients, indicating that GDP's influence on capital formation is primarily a long-run trend. The long-run coefficients show an increasing trend from lower to middle quantiles and then decrease at very high quantiles, suggesting that GDP's effectiveness diminishes beyond a certain level of capital formation.

Additionally, the study finds that gross national savings positively impacts Nigeria's capital formation in both the short run and the long run, with the long-run coefficients being consistently larger than the short-run coefficients. This highlights the importance of national savings in driving financial, product, and consumption expansions that stimulate capital formation. This conclusion is also supported by Akinola & Omolade (2013) and Nadabo, Tiri & Ismail (2024). The short-run quantile coefficients increase from low to mid quantiles and then gradually decrease, while the long-run quantile coefficients decline from lower to higher quantiles.

Table 5 VAR Granger causality/ block exogeneity Wald test result

Excluded	Chi-sq	Prob
Dependent variable: LCFM		
LEXD	9.775**	0.022
	3.288	0.188
	14.655***	0.000
ECR	22.117***	0.000
LGDP		
GNS		
All	52.576***	0.000

Source: authors' computation (2024)

Table 5 presents the results of the Granger causality tests conducted to validate the estimated results. The test indicates that external debt Granger causes capital formation, consistent with previous studies by Omosuyi (2024), Nadabo, (2023). This supports the argument that GDP is a significant predictor of capital formation in Nigeria, in line with the findings of Prakash, and Panigrahi (2024). Additionally, the test results show that national savings also Granger cause capital formation in Nigeria during the study period, aligning with the findings of Nadabo, & Maigari, (2021), Amali, (2023),and Ojonugwa, (2024).

5. Conclusion, Policy implication and Recommendations

The study examined the impact of external debt on capital formation in Nigeria using the Quantile Autoregressive Distributed Lag (QARDL) model. Results indicate a significant negative relationship between external debt and capital formation, with adverse effects observed in both the short and long run. The findings suggest that higher levels of external debt hinder capital formation by destabilizing investment decisions and distorting economic growth prospects. Additionally, the study highlights the positive impact of gross domestic product (GDP) and gross national savings on capital formation, emphasizing the importance of domestic savings in driving financial and production expansions.

Based on the study findings, the following policy recommendations are proposed to enhance capital formation and economic growth in Nigeria:

The government should focus on transparency, accountability, and fiscal discipline in managing external debt to ensure funds are used efficiently for sustainable development, preventing over-indebtedness and debt distress. Policies promoting domestic savings, such as

tax incentives and financial literacy programs, will reduce reliance on external borrowing. Diversifying the economy away from oil dependence towards agriculture, manufacturing, and services will stimulate growth. Improving export capacity through infrastructure development will boost foreign exchange earnings. Enhanced regulatory oversight of the financial sector will support sound lending practices. Collaboration between public and private sectors in infrastructure development will mobilize resources for job creation. Monitoring debt sustainability indicators is crucial for informed debt management strategies. Implementing these recommendations will strengthen domestic savings, diversify the economy, and manage external debt prudently for a more resilient economy.

REFERENCES

- Abdullahi, M. M., Bakar, N. A. B. A., & Hassan, S. B. (2016). Debt overhang versus crowding out effects: Understanding the impact of external debts on capital formation in theory. *International Journal of Economics and Financial Issues*, 6(1), 271-278.
- Adamgbo, S. L. C., & Felix, I. N. (2016). Analysis of External Debt Dynamics and Capital Accumulation in Nigeria; a Co-Integration Approach. *International Journal of Banking and Finance Research*, 2(2), 1-11.
- Akinola, G. W., & Omolade, A. (2013). Savings, gross capital formation and economic growth nexus in Nigeria (1975-2008). *Journal of Economics and Finance*, 1(2), 19-25.
- Amali, E. (2023). Lending rates and growth relationship in nigeria: the role of structural breaks maximillian belonwu. *Journal of Economics and Allied Research (JEAR)*, 170.
- Ambi, H. A., Waziri, S. I., Yakubu, Y., & Abdullahi, M. M. (2023). Analysis of the Impact of Domestic Debt on Private Investment in Nigeria. *Journal of Arid Zone Economy*, 2(2), 42-54.
- Bai, Y., Banerji, S., Wang, Z., & Zhang, W. (2024). Can participation in IMF programs facilitate sovereign debt rescheduling? The role of program size. *Journal of International Money and Finance*, 144, 103079.
- Chenery, H. B., & Strout, A. M. (1968). Foreign assistance and economic development: Reply. *The American Economic Review*, 58(4), 912-916.
- Cho, J. S., Kim, T. H., & Shin, Y. (2015). Quantile cointegration in the autoregressive distributed-lag modeling framework. *Journal of econometrics*, 188(1), 281-300.
- Chow, G. C. (2017). Capital formation and economic growth in China. In *Chinese Economic History Since 1949* (pp. 1186-1221). Brill.
- Dinga, G. D., Fonchamnyo, D. C., & Afumbom, N. S. (2024). A multidimensional appraisal of domestic investment, external debt and economic development nexus: evidence from SSA. *Journal of Business and Socio-economic Development*.
- Domar, E.D. (1946). "Capital Expansion, Rate of Growth, and Employment". In: *The Economic Journal* 14.2, pp. 137-147.
- Fumey, A., Bekoe, W., & Imoru, A. (2022). External debt servicing and capital formation in Ghana: An Autoregressive distributed Lag Analysis. *European Journal of Economic and Financial Research*, 6(1).
- Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: journal of the Econometric Society*, 424-438.
- Hernandez-Cata, E. (1988). Issues in the Design of Growth Exercises.
- Joy, J., & Panda, P. K. (2020). Pattern of public debt and debt overhang among BRICS nations: An empirical analysis. *Journal of Financial Economic Policy*, 12(3), 345-363.
- Kibona, A., & Kirama, S. L. (2024). The Causal Relationship between External Debts and Economic Growth in East African Community. *The African Review*, 1(aop), 1-30.

- Kolawole, B. O. (2024). External Debt and Economic Growth Relationship in Nigeria: A Reconsideration. *Theory, Methodology, Practice-Review of Business and Management*, 20(01), 21-32.
- Lidiema, C. (2018). *Intra-market linkages in the financial sector and their effects on financial inclusion* (No. 28). KBA Centre for Research on Financial Markets and Policy Working Paper Series.
- Mohammed, A. A., & Jibril, S. M. (2023). Rail Infrastructural Investment and Economic Growth in Nigeria: An Empirical Investigation. *Dutse journal of Economics and Development Studies (DUJEDS)*, 2023 December issue.
- Nadabo, Y. S., & Dakyong, T. G. (2023). Exploring the impact of financial development on agricultural output in Nigeria: the moderating role of institutional quality. *Journal of Economics and Allied Research (JEAR)*, 103.
- Nadabo, Y. S., Dakyong, T. G., & Ismail, H. (2024). Financial Development and Income Inequality in Nigeria: Testing the Financial Kuznets Curve Hypothesis. *FUDMA Journal of Accounting and Finance Research [FUJAFR]*, 2(1), 92-105.
- Nadabo, Y. S. (2023). Nexus between infrastructure development and manufacturing sector performance in Nigeria: the moderating role of institutional quality. *Journal of Economics and Allied Research*, 8(1), 151-165.
- Nadabo, Y. S., & Maigari, S. S. (2021). Asymmetrical effect of inflation on economic growth in Nigeria: evidence by nonlinear ARDL approach. *Journal of Economics and Finance*, 12(5), 21-8.
- Nadabo, Y. S., & Salisu, S. M. (2021). Entrepreneurship and economic growth nexus in Nigeria: moderating effect of institutional quality: ARDL cointegration approach. *Epra International journal of economic and business review* Vol. 9 No. 9 (2021): September.
- Nadabo, Y. S., & Salisu, S. M. (2021). Investigating the Expenditure-Economic Growth Nexus in Nigeria the Presence of Structural Breaks: A Nonlinear ARDL Cointegration Approach. *International Journal of Research and Innovation in Social Science*, 58(09), 61-74.
- Nadabo, Y. S. (2023). Revisiting the nexus between remittances and financial sector development in Nigeria. *Economic Journal of Emerging Markets*, 115-128.
- Ndemange, F. N. (2018). The Impact of External Debt Servicing on Capital Formation and Gross Domestic Product in Kenya. *Kenyatta University, Kenya*.
- Odhiambo, N. M. (2009). Finance-growth-poverty nexus in South Africa: A dynamic causality linkage. *The Journal of Socio-Economics*, 38(2), 320-325.
- Ojonugwa, A. M. (2024). External debt burden and economic growth in Nigeria. *Journal of Economics and Allied Research (JEAR)*, 218.
- Omodero, C. O. (2019). External debt financing and public capital investment in Nigeria: A critical evaluation. *Economics and Business*, 33(1), 111-126.
- Omosuyi, O. (2024). Public and publicly guaranteed external debt, debt servicing and investment in emerging economies. *Economic Annals*, 69(240), 31-56.
- Osevwe-Okoroyibo, E. E., Akpokerere, O. E., & Onatuyeh, A. E. (2024). External debt and gross domestic product in Nigeria and Ghana. *African Banking and Finance Review Journal*, 9(9), 162-171.
- Osuka, B. O., Otiwu, K. C., & Elizabeth, N. C. (2024) Interest Rates and Capital Formation in Nigeria. *International Journal of Banking and Finance Research*, 10(2), 131-142
- Oyekale, O., Tella, S., & Awolaja, O. (2024). External debt and corruption on economic development in ECOWAS countries. *Journal of Economics and Allied Research (JEAR)*, 153.
- Prakash, N., & Panigrahi, S. R. (2024). The impact of external debt on economic growth in emerging economies: investigating the role of capital formation. *International Journal of Economic Policy in Emerging Economies*, 19(1), 1-14.

- Root, F. R., & Ahmed, A. A. (1978). The influence of policy instruments on manufacturing direct foreign investment in developing countries. *Journal of International Business Studies*, 9, 81-94.
- Sadiq, S., Nosheen, M., & Naz, S. (2023). An Empirical Investigation of External Debt-Military Expenditure Nexus in Pakistan. *Journal of Contemporary Macroeconomic Issues*, 4(1), 43-56.
- Sachs, J. D. (2002). Macroeconomics and health: investing in health for economic development. *Revista Panamericana de Salud Pública*, 12(2), 143-144.
- Serin, Ş. C., & Demir, M. (2023). Does Public Debt and Investments Create Crowding-out Effect in Turkey? Evidence from ARDL Approach. *Sosyoekonomi*, 31(55), 151-172.
- Shahbaz, M., Zakaria, M., Shahzad, S. J. H., & Mahalik, M. K. (2018). The energy consumption and economic growth nexus in top ten energy-consuming countries: Fresh evidence from using the quantile-on-quantile approach. *Energy Economics*, 71, 282-301.
- Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. *Festschrift in honor of Peter Schmidt: Econometric methods and applications*, 281-314.
- Thilanka, H. R. A. C., & Ranjith, J. S. (2018). The impact of public debt on private investment: Sri Lankan experience. *International Journal of Business and Social Research*, 8(8), 1-10.
- World Bank. (2024). *World development report 2019: The changing nature of work*. The World Bank.
- Wu, J. Y., Opore, S., Bhuiyan, M. B. U., & Habib, A. (2022). Determinants and consequences of debt maturity structure: A systematic review of the international literature. *International Review of Financial Analysis*, 84, 102423.
- Xiao, J. J., & Yao, R. (2022). Good debt, bad debt: family debt portfolios and financial burdens. *International Journal of Bank Marketing*, 40(4), 659-678.