

Public Debt and Public Investment in Nigeria: An Asymmetric Investigation

¹Michael S. Akpan (PhD), ²Awujola Abayomi (PhD), ^{*3}Dauda A. Impalure

^{1, 2 & 3} Department of Economics, Bingham University, Karu Nasarawa State, Nigeria

*Corresponding Author: Dauda A. Impalure

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Abstract: The importance of public investment in a nation cannot be overemphasized due to the crucial role it plays in the growth and development of a nation. Whenever, a country is experiencing inadequacy in its domestic revenue, it resorts to borrowing to finance its domestic investment. Borrowing to carry out development projects, increase capital expenditure and investment in productive ventures will in the long run lead to economic growth and development. Unfortunately, the pattern of Nigeria's spending of its debt has over the years shown that the country borrows to service debt, meet current consumption and fund recurrent expenditure thereby not achieving the desired investment. Consequently, the objective of this paper is to analyze the asymmetric effect of public debt on public investment in Nigeria using time series data from 1981 to 2021. The data were estimated using the Non-linear Auto-Regressive Distributed Lag (NARDL) technique of analysis. The findings revealed that long run asymmetric effects of external debt and debt service on public investment were statistically insignificant, while the long run asymmetric effect of domestic debt on public investment was statistically significant. The result further revealed that the short run asymmetric effects of external debt, domestic debt and debt service on public investment were statistically significant. The paper recommended that the Debt Management Office (DMO) which is vested with the management of the country's debt should advice the federal government to minimize or discourage borrowing to fund her budget by encouraging revenue generation from the non-oil sector. Furthermore, funds should be sourced from domestic sources rather than external sources for development purposes. The borrowed funds should be channeled into investment in infrastructural projects that will improve public investment.

Keywords: Asymmetric, Debt Service, Deficit Financing, Domestic Debt, External Debt and Public Investment.

1. INTRODUCTION

Public investment plays important role in an economy because it helps a nation to achieve the desired economic growth and development by creating employment, increasing income of the people, as well as reduction of poverty, thereby raising the standard of living of the citizens. Public investments are expenditures on projects whose productive lives extend into the future in the form of infrastructural outlays such as roads, rail networks, ports, bridges, energy-generating plants, telecommunications structures, water as well as expenditures on education and health (UN, 2009). However, huge resources are often required for public investment to be realized especially when domestic savings are inadequate, hence the need for government to embark on public debt (external and domestic) to enable it carry out its desired investment. The Nigerian government has been embarking on deficit financing using debts to finance her budget. These debts are deliberately created for the purpose of expansionary fiscal policy and this happens when government expected expenditure is designed to exceed the expected revenue; and in most or some cases, such debts are designed to encompass domestic and foreign components depending however on whether the purpose of fiscal expansion necessitates foreign sourcing of resources (Akpan, 2013). Furthermore, if public debt is not properly managed, it can grow to the point of crisis as was the case with most developing countries' debts in the 1980s (Akomolafe, 2015). The Nigeria's Debt Management Office (2021) recorded that the country's total public debt increased from ₦33.1 trillion in 2021Q1 to ₦39.6 trillion in 2021Q4. This implies that from 2021Q1 to 2021Q4, Nigeria's total public debt increased by ₦6.5 trillion, showing an increase of 19.64%.

These debts were often contracted to augment shortfalls in anticipated domestic revenue to finance government public investment for infrastructural development. Hence, it is expected that as public debt increases, funds allocated for public investment will also increase. Ironically, despite such increases in public debt, the rates of public investments by government have either been declining or insufficient. Data from the CBN Statistical Bulletin (2021) indicated that lesser funds were allocated to capital expenditure relative to recurrent expenditure. For instance, between 2017 to 2021, funds allocated for recurrent expenditures were ₦4.78 trillion, ₦5.68 trillion, ₦6.99 trillion, ₦8.19 trillion and ₦9.15 trillion respectively. While for the same period, funds allocated for capital expenditures were ₦1.24 trillion, ₦1.68 trillion, ₦2.29 trillion, ₦1.61 trillion and ₦2.52 trillion (CBN, 2021). These figures show that government places less emphasis on public investment relative to recurrent expenditures. The implication is that most borrowed funds were used for statutory transfers, personnel costs, pensions, gratuities amongst others, while lesser funds were allocated for capital projects and infrastructures that are required to increase public investment. These actions have the potential to dampen public investment thereby affecting the growth and development of the country negatively. Furthermore, the increasing amount of resources allocated for public debt servicing reduced resource availability for public investment. Debt servicing is becoming a huge problem for Nigeria, looking at the country's revenue. The liability of debt with its associated servicing for example, reduces a country funds and restrains potential spending on other productive activities. This is even more coercing, looking at the limited revenue sources to pay the debt. Thus, heavy debt servicing makes fiscal stance of a country more vulnerable and detrimental to both domestic and external shocks. Statistics have shown that in the 2020 fiscal year, the Nigerian government used the sum of ₦1.85 trillion for domestic debt servicing, with the amount increasing to ₦2.05 trillion in 2021 fiscal year, showing a percentage increase of 10.8% (DMO, 2020). Similarly, the amount spent on external debt servicing increased from \$1.56 billion in 2020 fiscal year to \$2.11 billion in the 2021 fiscal year, showing a percentage increase of 35% (DMO, 2021). Such increases in debt servicing portray impending danger to the country's debt sustainability.

It was revealed by the debt management office that the increase in Nigeria's public debt servicing in 2021 was due to external debt of US\$4 billion Eurobond raised from the international debt market in September 2021 to boost the country's external reserve above US\$40 billion (DMO, 2021). The Medium Term Expenditure Framework and Fiscal Strategy Paper of the federal government projected that public debt servicing will increase to ₦6.31 trillion in 2023 and ₦10.43 trillion in 2025 (MTEF & FSP, 2021). It is imperative to note that whenever debt servicing of a country is high, it affects the country's public investment because funds that would have been channeled into infrastructures projects to achieve desired growth and development would be used to service debts. However, with Nigeria's narrow revenue base, if nothing is done to tackle the fiscal issues, the country might soon plunge into debt crisis and will not be able to sustain the debt. Consequently, these fiscal issues and the dearth of empirical research on asymmetric relationship between debt and investment in Nigeria motivated this study. Several authors have investigated the relationship between public debt and public investment through various studies. Studies such as Chukwu et al. (2021), and Ogunjimi (2019) revealed positive relationship, while other studies such as Omodero (2019) and Ncanywa & Masog (2019) found negative relationship. Consequently, this paper seeks to examine the asymmetric effect of public debt on public investment in Nigeria between 1981 and 2021 using a non-linear autoregressive distributed lag (NARDL) method of analysis. The paper therefore seeks to achieve the following specific objectives which include to:

- i. Investigate the asymmetric effect of external debt on public investment in Nigeria.
- ii. Examine the asymmetric effect of domestic debt on public investment in Nigeria, and
- iii. Evaluate the asymmetric effect of debt servicing on public investment in Nigeria.

The following formulated hypotheses were tested to show the validity of the objectives which include,

H₀₁: External debt has no significant asymmetric effect on public investment in Nigeria.

H₀₂: Domestic debt has no significant asymmetric effect on public investment in Nigeria, and

H₀₃: Debt servicing has no significant asymmetric effect on public Investment in Nigeria

The rest of the paper is further divided into literature review, results and discussion, and then the conclusion and recommendations.

2. LITERATURE REVIEW

2.1 Theoretical Framework

Several studies such as Chukwu et al. (2021), Omodero (2019), Picarelli et al. (2019), Ncanywa and Masog (2018), and Adamu (2016) investigated the relationship between public debt and public investment using various theories such as the crowd out theory, debt overhang theory, dual gap theory and Ricardian equivalence theory. The crowd out theory states that increase in government spending through borrowing would cause a transfer of scarce productive resources from the private sector to the public sector thereby crowding out private investment and reducing private consumption in an economy. The debt overhang theory explained why companies do not finance their activities with maximum debt because high amount of debts distort the possibility for companies to make optimal investment decision because future earnings goes to the creditors in form of debt payment (Myers, 1977). Krugman (1988) related the theory to a country by stating that if a country's debt level exceeds her repayment ability, some of the returns from investing in the domestic economy are taxed away by the creditors thus discouraging economic growth. The dual gap theory states that the developments of less developed countries are constraint by two gaps, which are investment-savings gap and foreign exchange gaps. To fill the savings investment gap requires foreign source, while the foreign exchange gap requires foreign aid (Harrod & Domar, 1946). Also, the Ricardian Equivalence theory states that when government stimulates the economy through borrowing, aggregate demand does not change but rather remain the same (Aisen & Hauner, 2008). The controversy is premised on the ground that the authority is faced with the decision to impose tax presently or in the future. Hence, when government opt to indulge in budget deficit, they have made a choice not to tax now but to tax later thereby reducing present tax rate and leaving taxpayers with more money to spend. Therefore, tax payers are quite rational and anticipate that they are going to pay higher taxes in the future. As a result, they will boost their savings to enable them meet up with payment of higher tax in the future.

However, this paper is underpinned by the Keynesian theory of public debt because of the peculiarity of the theory to the Nigerian economy. Keynes ideology on public debt was positive and contrary to the classical doctrine of crowding out theory. Keynes argument was based on the concept of the multiplier. The theory states that if an economy is operating at less than full employment, government spending would have a positive multiplier effect such that the total impact of public spending would more than offset the loss in investment occasioned by high rate of interest. Onwe (2014) stated that government spending has a multiplier effect on the economy, such that an extra amount of government expenditure would stimulate national income not only by the amount of the initial expenditure, but rather by a multiplier effect of several amounts. The offshoot of this is the increase in household consumption, occasioned by increased government expenditure, stimulates aggregate demand thereby signaling firms to raise production which will consequently bring about increase in private investment – a case of crowding-in of investment.

2.2 Empirical Review

Chukwu et al. (2021) examined the effect of public debt on public investment in Nigeria from 1985 to 2018 using secondary data from the Central Bank of Nigeria Statistical Bulletin. The dependent variable used for the study is public investment, represented by fixed investment measured by total assets of public investment and corporation, while the independent variables are public debt, budget deficit, ratio of export to GDP and ration of import to GDP. The Auto-Regressive Distributed Lag technique analysis was used to analyze the data. The study revealed the existence of long run relationship among the variables, while the short run result indicated that public debt has significant effect on public investment. The study therefore recommended that the Nigerian government should be channeling borrowed funds into investment that will bring growth in the economy. Also recommended was that wastage and corruption should be tackled by the government to make sure that funds meant for investment are judiciously utilized. However, the study failed to adopt a particular theoretical framework that the study is hinged on.

Omodero (2019) investigated external debt financing and its effect on public capital investment in Nigeria. Data for the study were obtained from the World Bank and Central Bank of Nigeria Statistical Bulletin 1996 to 2018. The dependent variable is government capital expenditure, while the key independent variables are external debt accumulation and debt servicing cost. The moderating variables used in the study were Inflation and exchange rates. The ordinary least squares multiple regression method was used as method of data analysis. The regression results revealed a significant negative impact between external debt and capital investment while debt servicing cost has a strong and significant positive effect on capital investment. Under these conditions, there is no significant relationship between controlling variables and capital

investment. Consequently, the study suggests that if external borrowing must be embarked upon emphasis should be on profitable capital investments. In other words emphasis should be on the establishment of industries, revival of abandoned industries and development of untapped natural resources in other to help in debt repayment. The study fails to include a theoretical framework that the study is based upon.

Picarelli et al. (2019) examined whether public debt produces a crowding out effect for public investment in the EU? The study uses a panel data for 26 Countries in EU, to investigate the degree to which decrease in public investment was caused by increased levels of public debt, the supposed debt overhang hypothesis. To deal with the endogeneity concerns, instrumental approach based on GMM estimation was used. The study revealed that debt overhang hypothesis can continue to be rigorous across different evaluation techniques. The GMM specification with year dummies revealed that 0.03% decrease in public investment was caused by 1% increase in public debt in EU countries within the period of the study. Furthermore, the study indicates that (1) high-debt countries largely influence the result; (2) the negative impact of debt on investment is slightly smaller in the Eurozone than in the entire European Union; (3) public debt reduces public investment with the effect of public debt stock more weighty than the flow. The study recommended that consequent policy implication might be that a measure focused on debt reduction would be less effective than an additional lending strategy.

Ogunjimi (2019) examined the impact of public debts on investment in Nigeria from 1981 to 2016 using the Autoregressive Distributed Lag (ARDL) technique of analysis. The study used the variables private investment; public investment, foreign direct investment and public debt in the study. The result revealed that domestic debt improved both private and public investment in the short-run and long-run. In other words, domestic debt crowded-in both private and public investment, but does not attract foreign direct investment (FDI). The study further revealed that external debt crowded in private investment both in the short-run and the long run, crowded-out public investment, but does not influence FDI. The study recommends that policy makers formulate and implement appropriate policies to ensure public debts are put to optimal use to stimulate investment. The study also recommends that external debt should be more favored over domestic debt because of its impact on investments. Ogunjimi used the right technique of data analysis. However, it failed to review relevant theories and theoretical framework for the study.

Ncanywa and Masog (2018) examined the influence of public debt on public investment and economic growth. The dependent variable used for the study was fixed investment measured by total assets of public investment and corporation, while the independent variables are public debt, budget deficit, ratio of export to GDP and ration of import to GDP. The Auto-Regressive Distributed Lag, granger causality, variance decomposition and impulse response function techniques of analyses were used to analyze the data. The results revealed existence of long run relationship among the variables as well as negative relationship between public debt and public investment. The study recommended that country with scarce capital should be encouraged to borrow in order to accumulate more capital for investment purposes. However, the study did not include the scope of the study as well as any particular theory to base its theoretical framework. The study also failed to show the sources of the data used for the study. Adamu (2016) investigated the effects of external debt on public capital investment in Nigeria spanning from 1970 to 2013 using Auto-Regressive Distributed Lag (ARDL) bound testing approach as method of data analysis. The dependent variable for the study public investment as % of GDP while the independent variables are external debt % GDP, real GDP, FDI % GDP, debt service and domestic savings % GDP. The study revealed that external debt does not influence public investment. Furthermore, the study revealed that the nature of poor domestic savings and investment causes higher debt service payments and crowded out available resources for investment. The study therefore recommended policy makers to adhere strictly to the appropriate use of debt through efficient investment to deter debt service payment from exceeding the country's capacity. The study did not explain any theory as the theoretical framework that the study is based on.

2.3 Method and Model Specification

Method of Analysis: Unit root tests were conducted using the Augmented Dicker Fuller test to determine the stationarity levels of the variables before conducting the cointegration test. According to Dicker and Fuller (1979), time series data needs to be stationary before carrying out any estimation in order to avoid spurious regression. After conducting the pre-diagnosis test (unit root), there was the need to ascertain the existence of long run relationship among the variables. Hence, the asymmetric bounds cointegration test derived from the Non-Linear Auto Regressive Distributed Lags (NARDL) model was used to test for long run relationship. The response of public investment to positive changes in public debt, is different

from the response of public investment to negative changes in public debt because most relationships in economics produces a non-linear result, hence the adoption of the NARDL method for the paper. Post-estimation tests which include; Breusch-Godfrey serial correlation LM test, normality test, and the Breusch-Pagan-Godfrey Heteroscedasticity test employed in the paper.

Model Specification: The explicit linear regression equation is specified thus;

$$PUINV = f (EXD, DMD, DSV,) \text{-----} 1$$

The econometric equation is specified thus;

$$PUINV_t = \beta_0 + \beta_1 EXD_t + \beta_2 DMD_t + \beta_3 DSV_t + \mu_t \text{-----} 2$$

Where:

- PUINV = Public investment
- EXD = External debt
- DMD = Domestic debt
- DSV = Debt servicing
- $\beta_1 - \beta_3$ = Coefficients of the parameters in the model to be investigated.
- β_0 = Intercept
- μ_t = Error term

Equation (2) is the baseline model for determining the effect of public debt on public investment in Nigeria. In other to capture the possible asymmetric effect of public debt on public investment, the NARDL technique decomposes the explanatory variables which are EXD, DMD and DSV into two parts: 1) partial sum of positive change denoted by EXD^+ , DMD^+ and DSV^+ ; 2) partial sum of negative changes denoted by EXD^- , DMD^- , DSV^- and these two partial sums (positive and negative) were included and presented as separate regressors in the model, which becomes

$$PUINV_t = \alpha_0 + \alpha_1 EXD^+ + \alpha_2 EXD^- + \alpha_3 DMD^+ + \alpha_4 DMD^- + \alpha_5 DSV^+ + \alpha_6 DSV^- + \mu_t \text{-----} 3$$

Equation (3) is thus specified to the NARDL equation in the form of Shin et al. (2014).

$$\Delta PUINV_t = \alpha_0 + \alpha_1 PUINV_t + \alpha_2 PUEXD_{t-1}^+ + \alpha_3 PUEXD_{t-1}^- + \alpha_4 PUDMD_{t-1}^+ + \alpha_5 PUDMD_{t-1}^- + \alpha_6 PUDSV_{t-1}^+ + \alpha_7 PUDSV_{t-1}^- + \sum_{i=1}^{n1} \psi \Delta PUINV_{t-i} + \sum_{j=0}^{n2} (\pi_j^+ \Delta PUEXD_{t-j}^+ + \pi_j^- \Delta PUEXD_{t-j}^-) + \sum_{j=0}^{n3} (\theta_j^+ \Delta PUDMD_{t-j}^+ + \theta_j^- \Delta PUDMD_{t-j}^-) + \sum_{j=0}^{n4} (\theta_j^+ \Delta PUDSV_{t-j}^+ + \theta_j^- \Delta PUDSV_{t-j}^-) + \mu_t \text{-----} 4$$

3. RESULTS AND DISCUSSION

3.1. Results

Table 1: Summary of Descriptive Statistics

Variables	Mean	Std. Dev.	Jarque-Bera	Prob.	Obs
PUINV	321.7100	355.3541	13.68816	0.001066	41
EXD	2311.985	3497.686	86.56325	0.000000	41
DMD	3594.826	5162.039	18.78994	0.000083	41
DSV	560.5500	950.0759	81.86417	0.000000	41

Source: Author’s Computation from Eview-10

Table 1 showed that domestic debt (DMD) has the highest mean value of 3594.826 and highest standard deviation of 5162.039. This means that domestic debt is the most volatile amongst the variables.

Table 2: Summary of Unit Root Test

Variables	ADF Statistics	Critical Value	Prob.	Order of Integration
LPUINV	-6.843494	-2.938987	0.0000	I(0)
LEXD	-4.863582	-2.938987	0.0004	I(1)
LDMD	-4.699981	-2.938987	0.0005	I(1)
LDSV	-5.445117	-2.941145	0.0001	I(1)

Source: Author's Computation from Eview-10

Summary of the unit root results in Table 2 shows that PUINV was stationary at level while EXD, DMD and DSV were found to be stationary after first difference; and at 5% level of significance.

Table 3: Summary of Asymmetric Bounds Test Results

F-Bounds Test	Null Hypothesis: No Levels Relationship			
Test Statistic	Value	Signif.	I(0)	I(1)
F—statistic	4.561690	10%	2.12	3.23
K	6	5%	2.45	3.61
		1%	3.15	4.43

Source: Author's Computation from Eview-10

The cointegration test result in Table 3 shows that the F-statistics value of 4.561690 is greater than the lower I(0) and upper bound I(1) critical values of 2.45 and 3.61 respectively at 5% significance level. These show that the variables are co-integrated, hence there is long run asymmetric relationship amongst the variables.

Table 4: NARDL – ECM Regression Results

Dependent Variable: D(PUINV)

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.282083	0.135988	2.074315	0.0500
D(LEXD_POS)	0.019732	0.232386	0.084910	0.9331
D(LEXD_POS(-1))	0.902687	0.323139	2.793497	0.0106
D(LDMD_POS)	-0.055502	0.515362	-0.107694	0.9152
D(LDMD_POS(-1))	-1.559549	0.513487	-3.037175	0.0060
D(LDSV_POS)	0.659304	0.277171	2.378692	0.0265
D(LDSV_POS(-1))	0.680055	0.199493	3.408917	0.0025
D(LDSV_NEG)	-0.530172	0.430867	-1.230478	0.2315
D(LDSV_NEG (-1))	-1.760153	0.536320	-3.281905	0.0034
CointEq(-1)*	-0.784014	0.122983	-6.374991	0.0000
R-square	0.638517			
Adjusted R-square	0.522327			
F-statistics	5.495419			
Prob(F-statistics)	0.000229			
Durbin-Watson stat	2.332453			
Long Run Form				
LEXD_POS	-0.088630	0.426574	-0.207772	0.8373
LEXD_NEG	-0.154687	0.220410	-0.701815	0.4902

LDMD_POS	1.009143	0.520235	1.939781	0.0653
LDMD_NEG	-13.50333	4.553252	-2.965647	0.0071
LDSV_POS	0.148155	0.552732	0.268041	0.7912
LDSV_NEG	1.087716	0.844372	1.288194	0.2111

Source: Author's Computation from Eview-10

3.2: Discussion of Findings

Findings of the paper as captured in Table 4 revealed that the positive and negative effect of external debt (EXD) on public investment (PUINV) is negative and statistically insignificant. The coefficient of long run effect of a positive change in EXD is -0.088630. This indicates that increase in EXD will results to decrease in PUINV in the long run. When EXD increases by 1 billion, PUINV will decrease by approximately 8.86 billion. On the other hand, the coefficient of long run effect of negative changes in EXD which is -0.154687 indicated that for every 1 billion decrease in EXD, the PUINV will increase by approximately 15.47 billion. Furthermore, the positive effect of domestic debt (DMD) on PUINV in the long run is positive and statistically significant at 10% level of significance. This implies that increases in DMD will results to increase in PUINV. When DMD increases by 1billion, PUINV will increase by approximately ₦100.19 billion. Also, the negative effect of DMD indicates that it has a negative and statistically significant effect on PUINV. A decrease in DMD will results to increase in PUINV to the tune of 13.50 billion in the long run. The findings further revealed that the positive and negative effects of debt service (DSV) on PUINV are positive and statistically insignificant. The coefficient of the long run positive changes in DSV indicates that increase in DSV results to increase in PUINV. That is, 1billion increases in DSV will lead to approximately ₦14.82 billion increase in PUINV. For the long run negative changes in DSV, 1billion decrease in DSV will result to 108.77 billion decreases in PUINV. Lastly, Table 4 revealed that the one period lag of the short run positive and negative effects of EXD, DMD and DSV are all statistically significant with probability values of 0.0106, 0.0060, 0.0025 and 0.0034 which are all less than 5%. Furthermore, the short run positive and negative changes of EXD, DMD and DSV in the current period are statistically insignificant with probability values of 0.9331, 0.9152 and 0.2315 respectively. The findings are in line with the study of Shah et al. (2023) and Siew et al. (2019)

Asymmetry Test

The paper conducted the asymmetry test to investigate the long-run and short-run asymmetric relationship of the variables under study. Asymmetric test tried to show if the positive and negative effects are of the same magnitude (symmetric) or of different magnitude (asymmetric). The null hypothesis of the test is that the inclusion of the partial sums of positive and negative changes in EXD, DMD and DSV are not significant (i.e. no asymmetries), and the alternative is that the decomposition of the changes is significant (i.e. there is asymmetries). The Asymmetry test is conducted using the Wald Test as represented at Table 5.

Table 5: Summary Results of Asymmetry Wald Test

Variables	Wald-Statistics		Evidence of Asymmetry	
	Long-run	Short-run	Long-run	Short-run
LEXD	0.026440 (0.8708)	4.383812 (0.0363)*	No	Yes
LDMD	14.71733 (0.0001)*	5.898755 (0.0152)*	Yes	Yes
LDSV	1.899029 (0.1682)	16.66309 (0.0002)*	No	Yes

Note: * denote rejection of the null hypothesis at 5% significance level. Values in parenthesis are the probabilities.

Source: Authors Computation from Eviews-10

The Wald test results for asymmetry shown at Table 6 indicates that the null hypothesis of no asymmetry in the long is **accepted** for external debt (EXD) and debt service (DSV) but **rejected** for domestic debt (DMD). But for the short run, the results revealed that the null hypothesis of no asymmetry is **rejected** for all the variables while the alternative of asymmetry is accepted. These showed that the in the short run, there is evidence of asymmetric effect between the partial sum of the positive and negative changes of EXD, DMD and DSV on public investment. However, in the long run, there is evidence of asymmetric effect of DMD on PUINV while there is no evidence of asymmetric effect of EXD and DSV on PUINV

Table 6: Robustness (Test) Results

Test		Outcomes	
		Coefficient	Prob.
Breusch-Godfrey-Serial-Correlation Test	F-stat.	1.356903	0.2802
Breusch-Pagan-Godfrey Heteroscedasticity Test	F-stat.	0.837334	0.6321
Normality test	Jarque-Bera	2.666495	0.263620

Source: Authors Computation from Eviews-10

From Table 6, the probability value of 0.2802 indicates that there is no serial correlation in the residuals of the model. Also, Heteroscedasticity probability value of 0.6321 indicates that the residuals are Homoscedasticity (no evidence of Heteroscedasticity in the estimated model). The probability value of the Jarque-Bera which is 0.263620 shows that the error terms are normally distributed.

4. CONCLUSION AND RECOMMENDATIONS

This paper examined the asymmetric effect of public debt on public investment in Nigeria using the Non-linear Auto-regressive Distributed Lag (NARDL) technique of analysis. The Keynesian theory of public debt was adopted as the theoretical framework. The cointegration indicate the existence of long run asymmetric relationship between public debt and public investment. Findings from the analysis revealed evidence of asymmetric effect (nonlinear) of external debt, domestic debt and debt service on public investment in the short run. However in the long run, domestic debt shows evidence of asymmetry while external debt and debt service show evidence of symmetry (linear effect) on public investment. The implication is that when government contracted debt to fund public investment, the debt will have significant impact on the desired investment in the short run but insignificant impact in the long run. These could be due to poor maintenance of public infrastructural projects insecurity, embezzlement amongst others. The paper contributed to the existing literatures due to its methodological approach in the use of NARDL model, which is different from other technique used by other studies. This methodology advanced the study of Chukwu et al. (2021) which used ARDL model. Based on the findings of this paper, the following recommendations are proffered: first, the federal government of Nigeria through the Debt Management office (DMO) should engage more on domestic debt rather than external debt. Secondly, the federal government of Nigeria should minimize or discourage borrowing form external sources to finance infrastructural projects, except for concessional loan. Thirdly, the federal government should develop other sector of the economy in order to have more revenue base. This will reduce the deficits in our budget and thereby minimize borrowing by the government.

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