



## Asymmetric Effect of External Debt on Foreign Direct Investment (FDI): Empirical Study from Nigeria

Mukhtar Shuaibu<sup>1\*</sup>, Jabiru Abdulhamid<sup>2</sup>

Federal University Birnin Kebbi, Nigeria

**Corresponding Author:** Mukhtar Shuaibu [mukhs001@yahoo.com](mailto:mukhs001@yahoo.com)

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### ABSTRACT

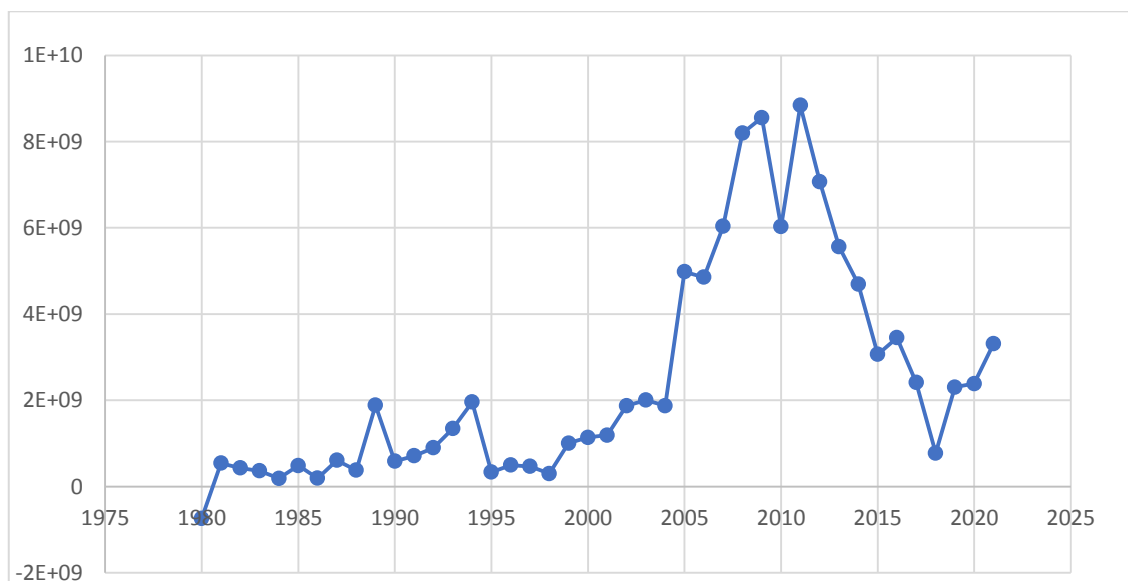
The paper examines the effect of external debt on FDI inflow in Nigeria between 1983 and 2021. Stationarity tests such Augmented Dickey Fuller (ADF), Phillips Perron (PP) as well as Guris (GUR) non-linearity unit root tests were employed to check the properties of the series. Non-linear Autoregressive Distributed Lag (NARDL) model was adapted to explore the relationship between the variables after confirming the mixed order of integration across the three testes. The Bound Test reveals the existence of a long-run relationship between the variables. According to the NARDL results; in the short-run a unit positive change in external debt would lead to decrease in FDI inflow by (1.165) while a unit negative change in external would lead to increase in FDI inflow by (1.360) and both are significance at 5% level of significance in short-run. The long-run results indicates that, the positive and negative change in external debt exhibit positive effect on net FDI inflow but only negative change is statistically significance at 5% level of significance. It is recommended that government should take steps in redemption of existing external debt and refrain from taking on any unnecessary new debt as these actions will not help the country's short run net FDI inflow and consequently, its overall economic growth.

## INTRODUCTION

Governments of developing nations enforce fiscal restraint measures by controlling borrowing and spending patterns as a means of securing FDI inflow into their nations and accelerate the rate of economic growth in term of GDP (Uzoma, et al. 2017). Due to sluggish pace of capital accumulation in developing economies, FDI serve as vital means by which the capital can flow from economies with excess capital to economies with shortage of capital specifically developing ones like Nigeria (Mugambi & Murunga, 2017). Inadequate infrastructural facilities in developing countries causes a rise in external debt, which is intended to be used to finance the construction of infrastructure that will increase investment opportunities, productive capacity and potential foreign capital inflow.

Similarly, investing in the foreign countries may leads to market expansion for foreign investors which intern increase the revenue of companies while at the same time it will benefit the host nations in term of facilitating transfer of technology hence minimize technological gaps with developed countries (Kumari & Sharma, 2017). Several factors such as, trade openness, trade barriers or restrictions imposed by host countries; cheap labour in the host nation; market size in term of GDP per capita which increase the prospects of gaining large sums of profits; labour quality in term of skill; the quality of infrastructure, host country's policies that relate to fiscal incentives in term of lower tax rates and tax relief, exchange rates regimes whether floating or pegged and fluctuation, better host country credit rating and institutional-political factors affect the FDI inflow into a host country (Sahiti, et al. 2018)

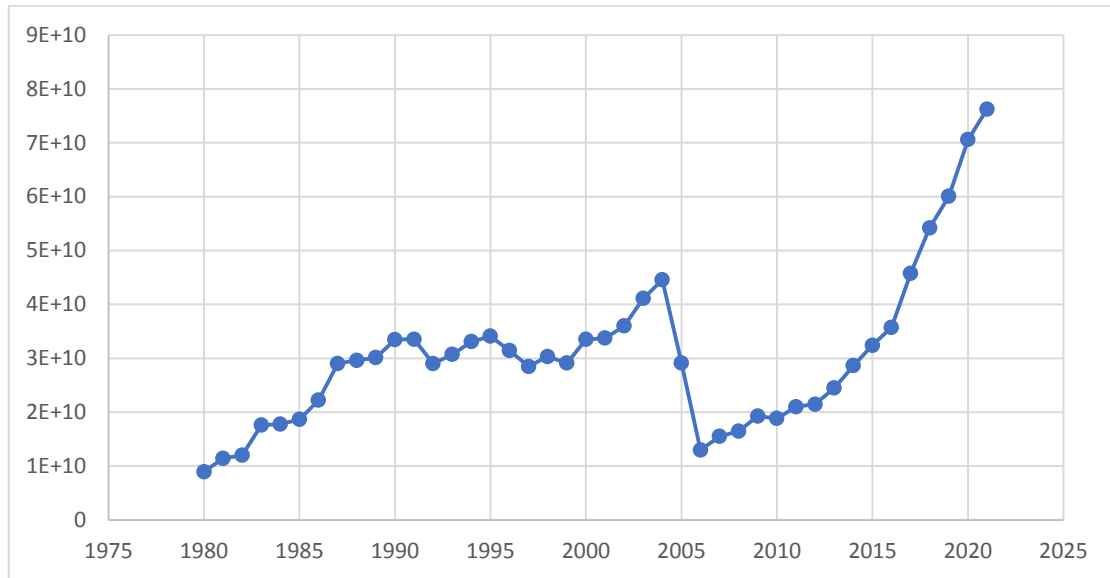
According to World Bank data, the net inflow of FDI into Nigeria fluctuates reaching it's peaked in 1994 at 5.790847305 (WDI, 2022). Nigeria has seen a very low net foreign direct investment inflow from 2014 to 2021. Figure 1 below depicts the trajectory of FDI inflow into Nigeria.



Source: Researcher's Plot Using Eview 10, 2023.

Figure 1: Trend of Nigerian Net FDI inflow

Similarly, Figure 2 depicts trend of Nigeria's externally sourced debt plot. It shows that external debt increased gradually between 1983 and 1991, then slightly decreased in 1992 before increasing again until 2004 to 2006, when Nigeria received debt relief from foreign creditors. From 2007 to the present, external debt has been increasing rapidly (WDI, 2022).



Source: Researcher's Plot Using Eview 10, 2023.

Figure 2: Trend of Nigerian external debt

## LITERATURE REVIEW

It seems there is no much improvement in terms of FDI inflow into Nigeria, despite various policy frameworks that have been introduced by the government in order encourage the inflow of FDI for growth and development of the country. Thus, Nigeria's enormous external debt load is a serious danger to FDI inflow since funds meant for infrastructural development of the nation are frequently diverted to meet obligations related to external debt services. Similar to this, a high debt stock makes it difficult for the nation to pay-off outstanding debt which lowers the nation's credit rating and raises the likelihood of low FDI inflows (Ologbenla, 2021).

According to economic theory, one of the main factors influencing FDI inflows is externally sourced public debt. This is based on the perception that, as external debt rises, taxes rise as well which will in turn discourage FDI inflow into highly indebted country (Mugambi & Murunga, 2017). Consequently, a nation's external debt profile can have an impact on investor confidence and the pace at which FDI enter the economy, particularly if there is a high likelihood of debt repudiation.

Thus, it is unclear from the previous studies conducted in this field such as (Cajano, et al, 2021) to established whether or not external debt affect FDI inflow. Consequently, the studies reviewed failed to include the potential of

discovering structural breaks and/or non-linearity in the external debt, which will have a major impact on the outcome of their studies. Thus, the primary objective of this paper is to analyse the impact of external debt on FDI inflow in Nigeria from the period of 1983 to 2021. Specifically, to examine the short and long-run impact of external debt on FDI inflow into Nigeria using non-linear ARDL method of analysis. The introduction is covered in section one, followed by a review of prior empirical studies and pertinent theories in section two, a discussion of the study methodology in section three, the results presentation is section four, and conclude the paper in section five.

## LITERATURE REVIEW

### *Theoretical literature review*

Theories of the location-based approach to FDI assert that, FDI location is determined by the goals it seeks to achieve, which include market, resource, efficiency and or strategic asset acquisition (Rahman & Semenovskiy, 2022). Therefore, a nation's potential to attract FDI is based on its overall wealth of the nation and government policies on the use and accessibility to these resources. Another theory of FDI is the Institutional Fitness theory which was based on the idea that countries have an advantage in utilizing FDI inflows because of their capacity to adjust to the expectations of both domestic and foreign investors. Consequently, it is dependent upon the four main pillars which are the market, government, education, and sociocultural fitness. Economic openness, managing external and internal debt, minimal trade domestic currency control, low bribery, and increased transparency are all regarded as indicators of a fit government. MNCs will avoid investing in nations with hostile or unfavorable policies towards them because political instability raises the risk associated with their capital (Rahman & Semenovskiy, 2022).

### *Empirical literature review*

Scholars utilize distinct methodologies in examining the effects of external debt on FDI in both industrialized and developing nations. Researchers like Mugambi and Murunga (2017) used VECM to look into how Kenya's foreign debt service affected FDI between 1980 and 2014. The long-run outcome demonstrates that, FDI is negatively affected by external debt repayment. Similarly, when looking into how, between 1984 and 2010, foreign debt limit the inward FDI and economic growth in developing nations. It has been shown that the external debt negatively affects FDI and growth. Specifically, economies with high levels of debt are unable to benefit from FDI as they work to lowering the debt levels above a certain point (Tanna, Li, & De Vita, 2018).

In the same vein, Uzoma, et al. (2017) investigate the factors that influenced FDI inflow into the Nigerian economy between 1980 and 2015 using VECM. They established that, significant long-term relationship between FDI in Nigeria and the level of internal and external debt, as well as the inflation rate and exchange rate appreciation exist. It has also been shown that, over time, exchange rates have a beneficial effect on economic growth, but internal and external debt and inflation rate have negative effects. Conversely, Kombui and

Kotey (2019) used Ordinary Least Square (OLS) to investigate the factors that influenced FDI in Ghana from 1985 to 2015. The study's conclusions show that, independent of the other explanatory factors, government spending, external debt, and infrastructure have a substantial positive effect on FDI.

Awuor et al. (2021) used multiple regression in exploring the relationship between public debt and FDI inflows into Kenya from 2010 to 2019. They discovered that while interest rates and the ratio of public debt to GDP had a positive effect on FDI regardless of other control variables. Similar to this, Cajano, et al. (2021) investigate effect of financial risk components including foreign debt, foreign exchange, and inflation rate on FDI inflow group eight nations that are split into two groups based on their income levels between 1995 and 2019. The findings indicated that while inflation and the financial crisis are both shown to be unimportant in determining FDI, foreign debt, currency rate, interest rate, and current accounts for lower-middle-income Asian nations are possible predictors of FDI. The findings showed that current accounts, foreign debt, interest rates, inflation rates, and currency rates are important FDI -influencing elements for Asian nations with upper-middle incomes.

Furthermore, Kumari and Sharma (2017) used imbalanced panel data for the years 1990–2012 for 20 developing countries to find important factors influencing FDI inflows. They did this by applying a fixed effect model. The findings indicate that, for the panel of developing nations under investigation, market size, trade openness, interest rate, and human capital provide significant coefficients in connection to FDI inflow.

Asbullah, et al. (2022) examined the factors that influence FDI from prior research and found that trade openness and infrastructure have a favorable impact on FDI while inflation has a negative impact. Corruption and FDI inflows were also shown to be negatively correlated, but market size and FDI inflows were positively and significantly correlated.

## METHODOLOGY

The source of data used in this study is World Bank's World Development Indicators (WDI, 2021) over the period 40 years from 1981 to 2021. Variables such as FDI is net inflows of Foreign direct investments (BOP, current US\$), EXDT which is external debt is measured by total External debt stocks (DOD, current US\$), INFR is inflation rate measured as a percentage change in consumers price index and GDP is Gross Domestic Product.

The ADF, PP and Guris non-linear unit root test were used to verify the properties of the series in the study. However, the traditional unit root such as is not efficient if non-linearity occurs in the series. Guris (2018) employed exponential smooth transition autoregressive (ESTAR) to ascertain the existence of non-linear unit root. This can be as express as in equation (1).

$$y_t = \alpha_0 + \alpha_1 \sin\left(\frac{2\pi k * t}{T}\right) + \alpha_2 \cos\left(\frac{2\pi k * t}{T}\right) + v_t$$

(1)

The ideal frequency, denoted as  $k^*$ , can be found by first giving  $k$  values that vary from 1 to 5, then utilizing OLS to predict the equation and minimizing the sum of the squares of the error terms. The error terms of the equation predicted will be obtained.

$$v_t = y_t - \alpha_0 - \alpha_1 \sin\left(\frac{2\pi k^* t}{T}\right) - \alpha_2 \cos\left(\frac{2\pi k^* t}{T}\right) \quad (2)$$

The test statistics are computed forecasting the equation (3) with the error terms generated in equation (1)

$$\Delta v_t = \delta_1 y_{t-1}^3 + \delta_2 y_{t-1}^2 + \sum_{j=1}^{p-1} \vartheta_{ij} \Delta v_{t-j} + \varepsilon_t \quad (3)$$

The null hypothesis is  $H_0: \delta_1 = \delta_2 = 0$  and the alternative hypotheses is  $H_1: \delta_1 = \delta_2 \neq 0$  are to be explored using F test. Rejecting null hypothesis indicate that the variable is stationary (Guris (2018)

Similarly, the functional form of the model used in this study is specified in equation (4) as follows;

$$LNNFDI = f(LNEXDT, INFR, LNGDP)$$

The functional relationship (4) can be express into modified Pesaran and Smith (1995) ARDL ( $p, q, q \dots q$ ) representations to accommodate the variables of the research as stated in equation (5).

$$\begin{aligned} \Delta LNNFDI_t = & \delta_0 + \sum_{j=1}^{p-1} \delta_1 \Delta LNNFDI_{t-j} + \sum_{j=1}^{p-1} \delta_2 \Delta LNEXDT_{t-j} + \sum_{j=1}^{p-1} \delta_3 \Delta INFR_{t-j} \\ & + \sum_{j=1}^{p-1} \delta_4 \Delta LNGDP_{t-j} + \beta_1 LNNFDI_{t-1} + \beta_2 LNEXDT_{t-1} + \beta_3 INFR_{t-1} \\ & + \beta_4 LNGDP_{t-1} + \varepsilon_t \quad (5) \end{aligned}$$

$\beta_1$  to  $\beta_4$  are the coefficients of long-run,  $\delta_1$  to  $\delta_4$  are dynamic coefficients short-run,  $\Delta$  is the first difference operator,  $\delta_0$  is the constant and  $\varepsilon_t$  is the error term.

The non-linear autoregressive distributed lag (NARDL), which was suggested by Shin et al. (2014), was modified to investigate the asymmetry relationship between LNNFDI, LNEXDT, INFR, and LNGDP. Equation (6) illustrates how variables having asymmetric features are broken down into positive and negative components.

$$\begin{aligned}
 \Delta LNNFDI_t = & \delta_0 + \sum_{j=1}^{p-1} \delta_1 \Delta LNNFDI_{t-j} + \sum_{j=1}^{p-1} \delta_2 \Delta LNE XDT_{t-1}^+ + \sum_{j=1}^{p-1} \delta_3 \Delta LNE XDT_{t-1}^- \\
 & + \sum_{j=1}^{p-1} \delta_4 \Delta INFR_{t-1}^+ + \sum_{j=1}^{p-1} \delta_5 \Delta INFR_{t-1}^- + \sum_{j=1}^{p-1} \delta_6 \Delta LNGDP_{t-1}^+ \\
 & + \sum_{j=1}^{p-1} \delta_7 \Delta LNGDP_{t-1}^- + \beta_1 LNNFDI_{t-1} \\
 & + \beta_2 LNE XDT_{t-1}^+ + \beta_3 LNE XDT_{t-1}^- + \beta_4 INFR_{t-1}^+ + \beta_5 INFR_{t-1}^- \\
 & + \beta_6 LNGDP_{t-1}^+ + \beta_7 LNGDP_{t-1}^- \\
 & + \varepsilon_t
 \end{aligned} \tag{6}$$

From equation (6)  $\delta_2$  and  $\delta_3$ ,  $\delta_4$  and  $\delta_5$ ,  $\delta_6$  and  $\delta_7$  are the short run asymmetric effect of external debt, inflation rate and lending rate respectively while  $\beta_2$  and  $\beta_3$ ,  $\beta_4$  and  $\beta_5$ ,  $\beta_6$  and  $\beta_7$  are the long run asymmetric effect of external debt, inflation rate and lending rate respectively. Wald test will be applied to determine the joint negative and positive effect. If the negative component is statistically significance from positive component, asymmetric effect is said to exist.

## RESEARCH RESULT AND DISCUSSION

### Descriptive Statistic

The result of the summary statistics of the variables used in the study is shown in table 1 as follows.

Table 1. Descriptive Statistic

Variables	Mean	S. D.	Skew	Kurt	J-B stat	J-B P.value
LNNFDI	21.15784	1.126258	-0.1441	1.905968	2.079938	0.353466
LNEDEBT	24.1097	0.400169	0.262871	3.045438	0.452511	0.797514
INF	18.99987	17.05159	1.816288	5.070492	28.40913	0.000001
LNGDP	21.53496	0.685101	0.31728	2.057122	2.098987	0.350115

Source: Researcher's Computation Using Eview 10, 2023.

The result of descriptive statistic shows there is evidence of significant variation in inflation for the period under consideration as confirmed by large standard deviation of 17.05159. The Jarque-Bera statistic within the threshold of 2 is an indication that the series is not normally distributed.

### Correlation Test

This section presents the result of correlation between the explained and explanatory variables used for this research. This is to determine whether explanatory variables have no exact or perfect correlation with explained

variable in order to avoid Multicollinearity. The result for correlation is shown in table 2.

TABLE 2: Correlation Test

Variables	LNNFDI	LNEDEBT	INF	LNGDP
LNNFDI	1			
LNEDEBT	-0.08853	1		
INF	-0.25374	0.086759	1	
LNGDP	0.669525	0.439468	-0.36233	1

Source: Researcher's Computation Using Eview 10, 2023

The result above reveals that, the independent variables have perfect negative or positive correlation with the dependent variable. The nonexistence of perfect correlation can be confirmed by correlation coefficient for all the variable with respect to the dependent variable which is less than -0.80 or 0.80. Hence we are not expecting multicollinearity in our model.

*Stationarity Test*

The result of the stationarity test is presented in table 3 below:

Table 3: UNIT ROOT TEST

	ADF TEST	PP TEST	GUR TEST
LNNFDI	-2.096930	-2.096930	8.52318
$\Delta$ LNNFDI	-10.23323*	-10.15378*	4.54370***
LNEDEBT	-1.618435	-0.738553	16.23161*
$\Delta$ LNEDEBT	-4.383606*	-4.287915*	13.13427*
INF	-2.836063***	-2.685573***	9.21543
$\Delta$ INF	-4.710328*	-10.04419*	3.20673***
LNGDP	-0.292842	-0.098627	7.03426
$\Delta$ LNGDP	-5.640707*	-5.667935*	3.78670***

Source: Researcher's Computation Using Eview 10, 2023.

Note \*, \*\*, and \*\*\* signifies 1%, 5% and 10% level of significance respectively

The ADF and PP tests results show the evidence of mix of I(0), and I(1) thereby confirming the suitability of the ARDL technique. Similarly, the result of Guris non-linear unit root test indicates that, external debt is stationary at level while the other variable are stationary at first difference which satisfy the condition for non-linear analysis.

*Bound test*

To ensure non-linear long run equilibrium relationship among the variables, Bounds test for cointegration is adapted and result is presented in table 4 below.

Table 4: Bounds Test for cointegration

F-statistic	I(0) at 5%	5% I(1) at 5%
4.241736	2.27	3.28

Source: Researcher's Computation Using Eview 10, 2023.

From table above, F-statistic is 4.242 which is above the upper bounds even at 5% level of significance. Thus, we concludes that, cointegration relationship is observed.

***NARDL short run Estimates and Error Correction term***

The short-run dynamic and ECM between are presented in table 5 below.

Table 5: Short run ECM/NARDL Regression result

	Coef	S.Error	t-Stat	P.value
ECM(-1)	-0.734*	0.110	-6.688	0.000
D(LNEDEBT_POS)	-1.165	1.064	-1.095	0.285
D(LNEDEBT_NEG)	-1.360**	0.499	-2.724	0.012
D(INF_POS)	-0.020**	0.008	-2.362	0.027
D(INF_NEG)	0.017**	0.007	2.299	0.031
D(INF_NEG(-1))	0.027*	0.007	3.549	0.002
D(LNGDP_POS)	-1.941**	0.819	-2.371	0.027
D(LNGDP_POS(-1))	2.938*	0.821	3.579	0.002
D(LNGDP_NEG)	4.116**	1.512	2.723	0.012
Long run asymmetry Wald test	4.773**(0.019)			
Short run asymmetry Wald test	9.547*(0.009)			

Source: Researcher's Computation Using Eview 10, 2023.

The NARDL  $ECT_{t-1}$  is negative significant at five percent which is required for dynamic stability. This indicates that, the rate at which errors are corrected on annual bases for equilibrium convergence is high at about 73.4 percent of the errors will be corrected on annually. The short run non-linear ARDL result from the table above reveals that, a positive change in external debt is associated with decrease in FDI inflow by (1.165) while a negative change in external debt is associated with increase in FDI inflow by (1.360) and the both positive and negative shock are significance in determining net inflow of FDI. Similarly, both negative and positive in inflation are statistically significance and negative affect FDI inflow by (0.020) and (0.017) respectively. On the other hand, the one lag period change in GDP is associated with (2.938)

increase in the net FDI inflow while a negative change in GDP decreases the FDI inflow by (4.116) point with negative and positive being statistically significance. The Wald test for long-run and short-run reveals that overall asymmetry exist in both long and short-run period because the probability value for each of the asymmetry test is less than (0.05).

*NARDL Long-Run Estimation Result*

The estimates of the long-run NARDL results is contained in the Table 6 as follows.

Table 6: Long-run NARDL Regression result

	Coef	S.Error	t-Stat	P.value
LNEDEBT_POS	2.581	2.253	1.145	0.264
LNEDEBT_NEG	-1.852*	0.545	-3.398	0.003
INF_POS	0.045**	0.019	2.430	0.024
INF_NEG	-0.019	0.015	-1.262	0.220
LNGDP_POS	-5.031	3.234	-1.556	0.134
LNGDP_NEG	5.607**	2.014	2.784	0.011
C	21.197	0.691	30.687	0.000

Source: Researcher’s Computation Using Eview 10, 2023.

Extract from table 6 shows that, in the long run both negative and positive change in external debt positively affect net FDI inflow but only negative change is statistically significance. It is reveals that positive and negative in external debt increases FDI by (2.581) and (1.852) respectively. The finding on inflation is also in line with that of external debt in which a positive and negative change in inflation is associated with (0.045) and (0.010) increase in net FDI inflow respectively. On the other hand, both positive and negative in GDP decreases net FDI in the long run by (5.031) and (5.607) respectively.

*Diagnostic Tests*

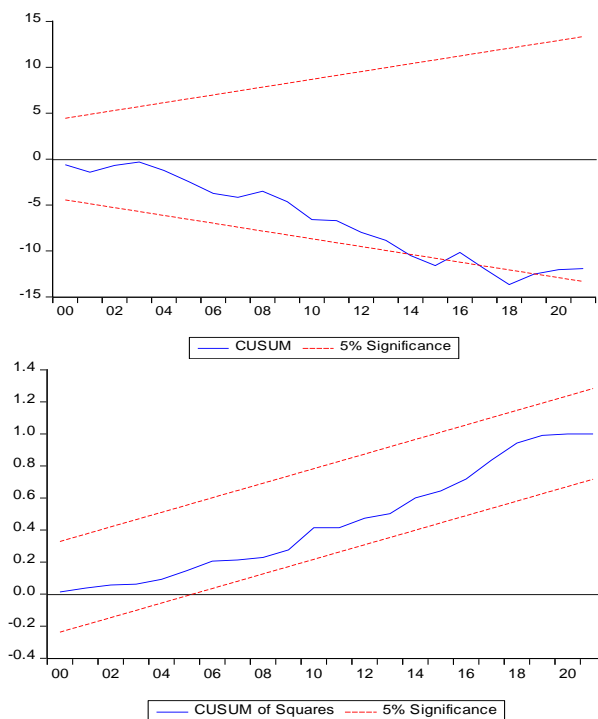
This section presents the CUSUM and CUSUM of Square test as well as the Jarque-Bera nomality test (JB N-Test), Breusch-Pagan-Godfrey Heteroskedasticity Test (BPG H-test), Breusch-Godfrey Serial Correlation LM Test (BG S-LM Test) and Ramsey RESET Test (R R-Test) for stability.

Table 7. Diagnostic tests result

	F-Statistic	P-Value
JB N-test	0.713681	0.4833
BPG H-test	2.145667	0.0553
BG S-LM Test	2.413468	0.1412
R R-Test	0.50934	0.4833

Source: Researcher’s Computation Using Eview 10, 2023.

As the result from the show, the result of our model did not suffer from serial correlation and Heteroskedasticity. Similarly, the model is stable with error term that is approximately normally distributed.



Source: Researcher plot Using Eview 10, 2023.

Figure 3: CUSUM and CUSUM of squares

As can be seen from the plots the estimated coefficients of the model are stable the blue line is within the 5% level of significance.

## CONCLUSIONS AND RECOMMENDATIONS

The study analyses the impact of external debt on FDI inflow in Nigeria from the period of 1983 to 2021. Non-linearity ARDL method of analysis is employed due to the confirmation of mixed order of integration from stationarity test results. The findings of short run non-linear ARDL results, it is found that, a positive change of external debt leads to the decrease in FDI inflow while a negative change of external debt leads to the increase in FDI inflow. In the long-run, both negative and positive change in external debt positively affect net FDI inflow in Nigeria. Therefore, it is recommended that government should take steps in redemption of existing external debt and refrain from taking on any unnecessary new debt as these actions will not help the country's short-run net FDI inflow and consequently, its overall economic growth.

## ADVANCED RESEARCH

This research paper examines the relationship between external debt and foreign direct investment (FDI) inflow in Nigeria between 1983 and 2021. The study utilizes various statistical tests, including Augmented Dickey Fuller (ADF), Phillips Perron (PP), and Guris (GUR) non-linearity unit root tests, to analyze the properties of the series.

After confirming the mixed order of integration across the three tests, a Non-linear Autoregressive Distributed Lag (NARDL) model is employed to explore the relationship between external debt and FDI inflow. The Bound Test reveals the existence of a long-run relationship between the variables.

The NARDL results indicate that in the short-run, a unit positive change in external debt leads to a decrease in FDI inflow by 1.165, while a unit negative change in external debt leads to an increase in FDI inflow by 1.360. Both of these effects are statistically significant at the 5% level of significance.

In the long-run, the results show that both positive and negative changes in external debt have a positive effect on net FDI inflow. However, only the negative change in external debt is statistically significant at the 5% level of significance.

Based on these findings, it is recommended that the government takes steps to redeem existing external debt and refrain from taking on unnecessary new debt. These actions will not only help improve the country's short-run net FDI inflow but also contribute to its overall economic growth.

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