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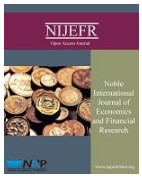

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Impact of Public Debt on Inflation and Unemployment in Nigeria: An ARDL Vector Error Correction Model

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Abstract: Debt is an important source of government funds in developed and developing countries. In developed countries, debt is an important source of money for bridging the gap between government revenues and expenditures.This paper measures the impact of public debt on inflation and unemployment in Nigeria during the period 1985 to 2020. It uses annual data of 36 years range to conduct various types of econometric tests. It uses Autoregressive Distributive Lag model (ARDL) Error Correction Model (ECM) for the analysis of the data. Unit root tests and Granger causality tests were also conducted to test the efficacy and predictive capability of the model. The findings of the study show that long run relationship exists between public debt and unemployment in Nigeria. It shows that increase in public debt causes more unemployment, but that external debt causes more unemployment than domestic debt. But the results of cointegration analysis show absence of relationship between public debt and inflation. The paper recommends reduction in public debt and if at all government must borrow, then it shall give priority to domestic debt over foreign debt.

Keywords: Public Debt, Inflation, Unemployment, Nigeria, ARDL.

1. Introduction

Government, just like individual, sometimes needs to borrow to attend to its economic and financial needs. Government sells bonds, borrow from local and international banks as well as from other governments around the world to meet its borrowing requirements. Some of the international multilateral agencies that government turn to during their borrowing activities include the World Bank, IMF, African Development Bank, etc. government borrow to finance budget deficit; it also borrow when there is natural calamities such as COVID-19 pandemic. Government borrows for the purpose of economic development such as need for long term planning to finance infrastructural build up. When government spends more than it receives it has a budget deficit; the accumulation of past borrowing is the government debt. The issue of national debt is not usually taken lightly. The Greece and Argentina debt crises have harrowing story to tell to other fast growing debtor nations. Closer to home, the Nigerian debt overhang of the 1980s and 1990s is still in the memories of many Nigerians (Abdullahi, 2018). There are a lot of debates about the long term effect of debt; some see it as a burden on future generations. But others argued otherwise; they argued that if the public debt is incurred during a period of recession or unemployment, there is no burden either on the present or future generation. In fact, the present generation benefits from increase in output, employment and income. On the other hand, the future generation will benefit from the portion of the nation's capital stock they will inherit (Jhinghan., 2011).

Public debt simply means borrowing from the public. Public debt serves as source of capital formation. Public debt is a compulsory saving in an economy where there is low level of saving by its citizens. Government debt is equivalent to future taxes, and if consumers are forward looking, future taxes are equivalent to current taxes. Hence, financing the government by debt is equivalent to financing it by taxes (Mankiw, 2007). According to the traditional view on the matter, a government budget deficit expands aggregate demand and stimulates output in the shortrun but crowds out capital and depresses

economic growth in the long run. According to Ricardian view, a government budget deficit has none of these effects, because consumers understand that a budget deficit represent merely the postponement of a tax burden (Mankiw, 2007). Public debt acts as a tool for stabilizing an economy. When government levies new taxes to pay back the money they borrowed, the consumption level of tax payers reduces. But if the government spends the debt money in the domestic economy, income and consumption increase.While if the borrowed money is used in boosting the production capacity of the economy, it leads to increase in output and reduction in unemployment. Barro (1974) has argued that the method of financing government purchases of goods and services is inconsequential. According to Tobin and Golub (1998), if the public anticipate an inflation tax as a consequence of expected money growth to finance budget deficit, a Ricardian could say that it is the equivalent current explicit taxes or nonmonetary debt issues.

Ideally, public debt shall be measured in real terms rather than nominal term. Therefore, budget deficit shall always be corrected for inflation. Public debt follows business cycle, which means that during recession public debt usually increase; while during boom it reduces. There are a number of different contrasting views on the role of deficit budgeting on consumers. For example, when tax is cut by government resulting in a budget deficit, consumers responded by spending more. Since the after tax income has now increased, allowing consumers with more after tax income than before. But, the Ricardian equivalence view sees government debt from the point of view of forward-looking consumers, i.e through the lens of rational expectation. Forward-looking consumers leave their consumption unchanged because tax reduction today will be compensated by tax increase in the future. Debt is another important source of government income in Nigeria. In developed countries, debt is an important source of revenue for bridging gap between government revenues and expenditures (Abdullahi, 2018). The 1980sand 1990s were unique in the history of Nigeria. They were decades during which Nigeriaexperienced falling revenues, due to falling price of crude oil, rapid growth in population and the decline of agriculture assource of foreign exchange. There are costs to borrowing within a country's own borders. But, by borrowing domestically a country is avoiding risks associated with borrowing in foreign currency, i.e. the exchange rate risk. External borrowing comeconditionality which might not be favorable to the borrower. Debt transfers power from borrower to lender (Abdullahi, 2018). There is interest risk especially associated with borrowing from international lenders.

2. Literature Review

Public debt has expansionary effects on an economy when the debt is spend on public work; this because it will lead to inflation and other consequential negative effects. Inflation is usually defined as persistent and appreciable rise in the general price level (Shapiro, n.d.). Inflation reduces the burden of interest rate charges paid on debt. Because the credit rating of government is higher than that of an individual they pay less interest than the individual. Public debt is used as a tool of controlling inflation; this is achieved through collecting money from the hands of the public who purchase government bonds. But, the money use in government expenditure can result in creating inflationary condition. Deficit financing raises aggregate demand in relation to aggregate supply, thereby leading to inflationary rise in prices. At the same time, when government repays its internal debt to the public, it leads to increase in the money supply with the public. Economists such as Lindholm and Driscoll (1967) thought that when government borrows from domestic banks, the effect is inflationary, because it increases the amount of bank credit available in the economy. The inflationary effect of government borrowing may be helpful to business in times of depression, but it contributes to high prices in times of prosperity or war (Lindholm and Driscoll, 1967). But borrowing from individuals through issuance of bond by government is not considered inflationary according to this reasoning. The effect is opposite i.e. deflationary; because it leads to less money in the hand of individuals and hence less purchasing power. But when the government spends the money it has borrowed the deflationary effect is cancelled. By borrowing from the domestic market, government is crowding out private borrowers and increasing the cost of borrowing in the process.

Iwedi (2020) investigates relationship between domestic debt and inflation in Nigeria. The study used time series data covering the period 1960- 2016. He used both descriptive and granger causality techniques to analyze the data. The result indicates domestic debt is causally prior to inflation, implying that domestic debt influences inflation. Mba *et al.* (2013) analysed the importance of domestic debt on economic growth in Nigeria. To empirically determine the relationship between domestic debt and some macroeconomic variables, they employed the error correction model. Finding show that domestic debt and has direct relationship with GDP and that debt servicing has inverserelationship with GDP. The

implication of the study shows that domestic debt should be invested in productive sector of the economy; more specifically in the real sector. Ajayi and Edewusi (2020) examined the effect of public debt on economic growth in Nigeria.Secondary time series data spanningthirty-seven years (1982-2018) was used for the study. Data was estimated using Johansen co-integration test and vector error correction model. Results of the study suggest that external debt exerts a negative long effect on economic growth whiledomestic debt exerts positive effect on economic growth. Thestudy suggested that policy makers should integrate appropriate measures in managing domestic debts; government should ensure that debts are directed to the provision ofbasic amenities and services required for development.

Yusuf and Mohd (2021) investigated the effect of government debt on economic growth in Nigeria using data from 1980 to 2018 and Autoregressive Distributed Lag method. The results showed that external debt is an impediment to long-term growth while in the short-term it is growth-enhancing. In addition, domestic debt had positive impact on long-term growth while its short-term effect is negative. In the long term and short term, debt service payments led to growth retardation confirming debt overhang effect. Victoria *et al.* (2021) investigates the effect of domestic public debt on economic development in Nigeria in the period spanning from 1981-2018. The study made use of cointegration method and Ordinary Least Square Regression to determine the statistical relationship between domestic public debt, Human Development Index and private sector investment. The outcome of study showed that domestic debt servicing and state governments' domestic debts are related to economic development. Also, Federal domestic debt and State domestic debt are significantly related to private sector investment. Essien *et al.* (2016) examine the impact of public sector borrowings on prices, interest rates, and output in Nigeria. They utilized a Vector Autoregressive framework, the Granger causality test, impulse response, and variance decomposition of the various innovations to study the impact. They found that the level of external and domestic debt had no significant impact on the general price level and output. Shuaibu *et al.* (2021) measure labour market dynamics in Nigeria focusing on the relationship between economic growth and unemployment. They used data ranging from 1991 to 2020 and employed GMM and ARDL models to analyze the data. The result from the analysis shows that there is positive relationship between unemployment and economic growth, confirming the existence of the phenomenon of jobless growth in Nigeria.

Iwuoha (2020) tried to find out whether borrowing helped reduce unemployment in Nigeria, using time series data from 1981 - 2019. Employing VECM model, he carriedcointegration tests. Existence of cointegration was confirmed indicating a relationship between public debt and unemployment, an inverse relationship. He also recorded a high value of ECM. It was also found that unemployment granger causes government debt. The result shows that public debt has rendered little or no assistance in combating unemployment.Ogonna *et al.* (2016) examined the implications of rising public debt on unemployment in Nigeria (1980-2015) using the auto regressive distributed lag model. The findings of the study show that a long run relationship existed. Estimated from the ARDL long run test show that 1% increase in public debt brings about 1.6% increases in unemployment. The ARDLlong run test also reveals that 1% increase in GDP growth rate brings about0.12% decrease in unemployment. They also found that 1% increase in inflation rate brings about 0.2% decrease in unemployment. They concluded that public borrowing in Nigeria has not created desired impact on the economy; since theincrease in public debt has not reduced unemployment. Ademola and Badiru (2016) investigate the effects of unemployment and inflation on economic performance in Nigeria. Ordinary Least Square (OLS) technique was adopted with various diagnostic tests to determine the model. The result of indicates that there are two cointegrating equation implying that there exist long-run relationship between RGDP, Unemployment and inflation. It indicated that unemployment and inflation are positively related to economic growth. Shuaibu *et al.* (2021) finds out the factors that explain economic growth in Nigeria.The authors used ARDL and GMM model to analyze the data that ranged from 1989 to 2019. The results, among others, show that government size which is base on government consumption expenditure is positively related with economic growth.

3. Data and Methodology

3.1. Data

Data used for the study were sourced from National Bureau of Statistics and Central Bank of Nigeria for the period 1985 to 2020. They are annual data for 36 years that cover inflation, unemployment, domestic debt and external debt of Nigeria.

3.2. Empirical Model

In order to measure the effects of public debt on inflation and unemployment in Nigeria we tested two empirical models. Model 1 tests the effects of public debt on unemployment; while model 2 tests the effects of public debt on inflation.

Model 1:

$$unem = \alpha + \beta dodb + \gamma exdb + \varepsilon \quad (1)$$

Where,
unem = unemployment
dodb = domestic debt
exdb = external debt

Model 2:

$$infl = \alpha + \beta dodb + \gamma exdb + \varepsilon \quad (2)$$

Where,
infl = inflation

3.3. Method of Analysis

The major method of analysis used for this work is ARDL ECM. The Autoregressive Distributed Lag (ARDL) approach to co-integration was proposed by Pesaran *et al.* (2001) to empirically analyse long- and short-run relationship. Themethod presents some advantages over alternative methods commonly used in empirical analysis. First, the ARDL bounds testing method allows the study of long-run relationships between variables, irrespective of whether they are stationary at levels (I(0)), first difference (I(1)) or fractionally integrated. This helps to get over some of the common challenges encountered in time series research. Second, ARDL method estimations simultaneously both the short-run and long-run impacts, removing problems of omitted variables and autocorrelation. Third, Pesaran and Shin (1999) specified that the short- and long-run parameters calculated using ARDL methodis reliable and efficient for small sample analysis.The ARDL bounds test procedure is based on the F-test; it investigates the presence of long-run linkage between the variables and it also test for joint significance of lagged level variables.Before carrying out any co-integration analysis, tests for stationarity and order of integration of the variables must first be carried out. ARDL bounds test cannot provide robust results in the presence of I(2) variables. The study employed Augmented Dickey-Fuller (ADF) unit root test to check for stationarity properties of the variables.

4. Results and Discussion

4.1. Summary Statistic

The summary of the variables data used for the study show that unemployment has the lowest standard deviation while external debt has the highest. But, on the other hand, while external debt has the lowest JarqeuBera, unemployment has the highest.

Table 1. summary statistic

	DODB	EXDB	INFL	UNEM
Mean	5238.594	30821577	19.18306	4.525833
Median	1247.850	30217853	12.39000	3.830000
Maximum	31000.00	54832397	72.84000	9.010000
Minimum	27.90000	12961871	5.390000	3.000000
Std. Dev.	8487.830	10117290	17.69343	1.612429
Skewness	1.866958	0.590934	1.742256	1.904396
Kurtosis	5.243694	3.277934	4.693942	5.123305
Jarque-Bera	28.46444	2.211087	22.51689	28.52298
Probability	0.000001	0.331031	0.000013	0.000001
Sum	188589.4	1.11E+09	690.5900	162.9300

Sum Sq. Dev.	2.52E+09	3.58E+15	10957.01	90.99748
Observations	36	36	36	36

Source: author's analysis using Eview

4.2. Correlation Analysis

The results of the correlation analysis show that inflation is negatively related with unemployment and domestic debt but positively related with external debt; while unemployment is positively related with external and internal debts.

Table 2. correlation analysis

Correlation				
Probability	UNEM	INFL	EXDB	DODB
UNEM	1.000000			

INFL	-0.170153	1.000000		
	0.3211	-----		
EXDB	0.673184	0.099308	1.000000	
	0.0000	0.5644	-----	
DODB	0.908649	-0.227811	0.632310	1.000000
	0.0000	0.1815	0.0000	-----

Source: Author's analysis using Eview

4.3. Unit root Tests

The result from the unit root tests show that there is unit root across the variables when ADF test was conducted at level.

Table 3. Augmented Dickey-Fuller Unit Root tests Results

Variable	**t-statistic**	**Probability**
External debt	-1.984107	0.2921
Domestic debt	1.789636	0.9995
Unemployment	0.373495	0.9789
Inflation	-2.318149	0.1735

Source: Author analysis using Eview; tests were conducted at level

4.4. Granger Causality Test

The results of the granger causality tests show that there exist relationships between all the variables in the study except between unemployment and domestic debt. This means that each variable Granger caused the other except unemployment and public debt, see table 3. The result of domestic debt granger causing inflation is in line with the finding of Iwedi (2020).

Table 4. Results of granger causality tests

Null Hypothesis:	Obs	F-Statistic	Prob.
EXDB does not Granger Cause INFL	34	0.54591	0.5852
INFL does not Granger Cause EXDB		0.00309	0.9969
DODB does not Granger Cause INFL	34	0.49522	0.6145
INFL does not Granger Cause DODB		0.46824	0.6308
UNEM does not Granger Cause INFL	34	1.35435	0.2740
INFL does not Granger Cause UNEM		0.83170	0.4454
DODB does not Granger Cause EXDB	34	2.98615	0.0662
EXDB does not Granger Cause DODB		0.78560	0.4653
UNEM does not Granger Cause EXDB	34	3.26489	0.0526
EXDB does not Granger Cause UNEM		0.06051	0.9414
UNEM does not Granger Cause DODB	34	6.77412	0.0039
DODB does not Granger Cause UNEM		11.0843	0.0003

Source: Author's analysis using Eview

4.5. ARDL ECM

In order to determine the short-run impact of public debt on inflation and unemployment in Nigeria, we estimate Error Correction Model (ECM) associated with the respective long-run relationships. Table 5 and 6 presents the short-run coefficients of the impact of public debt on inflation and unemployment in Nigeria.The error correction term (ECM(−1)) represents the speed of adjustment that restores equilibrium in the dynamic model after a disturbance.The result of the ECM shows that the rate of adjustment of model 1 toward equilibrium is 24%. For model 2, ECM show that the rate of adjustment is 50%. This means that model 2 adjust towards equilibrium faster than model 1. The models follow a priori expectation as they were both negative and statistically significant. ECM values imply that shock to the two models in the current period will be restored at a speed of adjustment of about 24% and 50%, respectively, in the next period.

Table 5. short run ECMestimated results for model1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNEM(-1))	0.130165	0.109551	1.188169	0.2487
D(UNEM(-2))	-0.418045	0.101126	-4.133886	0.0005
D(EXDB)	1.33E-08	1.17E-08	1.133856	0.2703
D(EXDB(-1))	-2.19E-08	1.22E-08	-1.801087	0.0868
D(DODB)	0.000423	9.77E-05	4.330808	0.0003
D(DODB(-1))	-0.000545	0.000162	-3.367705	0.0031
D(DODB(-2))	0.000803	0.000155	5.175638	0.0000
D(DODB(-3))	-0.000923	0.000128	-7.205772	0.0000
ECM(-1)	-0.243294	0.060524	-4.019826	0.0007

Source: Authors' analysis using Eview

Table 6. short run ECM estimated results for model 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFL(-1))	0.341883	0.166216	2.056857	0.0495
D(INFL(-2))	-0.204953	0.171620	-1.194223	0.2428
ECM(-1)	-0.496046	0.182182	-2.722813	0.0112

Source: Authors' analysis using Eview

4.6. ARDL Bound Testing

The result of the ARDL bound testing for model 1 show that there exist a long run relationship between public debt and unemployment at 10% level of significant. Hence, this establishes the fact that these variable co-move in the long run and any deviation in short run will return to equilibrium in the long run. This finding is in line with that of Iwuoha (2020). But, for model 2 the result show no existence of cointegration, meaning there is no long run relationship between public debt and inflation during the period of the study, see table 7 and 8.

Table 7. Bound Testing for model 1

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.512827	10%	2.63	3.35
K	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5

Source: Authors' analysis using Eview

Table 8. Bound Testing for model 1

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	1.668085	10%	2.63	3.35
K	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5

Source: Authors' analysis using Eview

4.7. Long Run Cointegration Analysis

The result of both long run ARDL form and simple cointegration analysis shows that for model 1, public debt (both external and domestic) has positive effects on unemployment. This means that public debt increase unemployment in Nigeria. But, external debt increase unemployment more than internal debt, see table 9. The result of positive relationship between public debt and unemployment is in line with the findings of Ogonna *et al*. (2016). The results for model 2 shows no existence of long run relationship between public debt and inflation. This means that in the long run public debt does not affect inflation in Nigeria, this is in line with the work of Essien *et al.* (2016) who also found absence of relationship between inflation and public debt in Nigeria.

Table 9. Long run cointegration analysis for model 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXDB	3.50E-08	1.66E-08	2.112355	0.0426
DODB	0.000151	1.95E-05	7.769575	0.0000
C	2.631323	0.476132	5.526462	0.0000

Source: Authors' analysis using Eview

Table 10. Long run cointegration analysis for model 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXDB	7.65E-07	5.07E-07	1.508546	0.1412
DODB	-0.001074	0.000595	-1.807278	0.0801
C	1.574450	14.54796	0.108225	0.9145

Source: Authors' analysis using Eview

5. Conclusion and Implications

The results from these analysis show that public debt impacted unemployment in Nigeria by increasing the rate of unemployment. This means that policy makers shall be very wary of taken debt (especially foreign debt) looking at it effects on unemployment in Nigeria. Nigeria current rush to accumulate foreign debt shall be done with utmost care; government shall seek the advice of experts on this very crucial matter before continuing to accumulate foreign debts. The statistically insignificant relationship between public debts and inflation in Nigeria leave us with a inconclusive stance. Hence, public debt in Nigeria is more impactful on unemployment than inflation despite the theoretical precedents. Nigerian government shall prioritize domestic debt over foreign debt which comes with additional costs.

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