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ESTIMATION OF PUBLIC DEBT EFFECT ON UNEMPLOYMENT AND INFLATION IN NIGERIA

ABSTRACT

Being one of the important sources of government revenue, both the developed and developing economies borrow to close the gap that exists between government revenue and expenditure. This study estimated the effects of public debt on unemployment and inflation in Nigeria. A 40 years' time-series annual data on external debt, domestic debt, unemployment and inflation, spanning from 1980 to 2020 was used. Relevant diagnostic tests using E-views were conducted to test for unit root and granger causality. Autoregressive Distributive Lag Model (ARDL) Error Correction Model were employed to analyze the data. The findings revealed that public debt and unemployment have a log run relationship. When borrowing increase in Nigeria, unemployment increases the more. Further findings indicated that domestic debt causes less unemployment than external debt. However, cointegration analysis pointed no long-run relationship existing between public debt and inflation. The study urges the government to consider other important sources of revenue generation than borrowing. When borrowing becomes necessary then priority on internal debt is highly recommended.

Keywords: *Public Debt, Unemployment, Inflation*

Introduction

Individuals and private entities borrow to meet up their economic and financial needs. So also, is the government who finds it essential to borrow either domestically through the sales of bonds and other local sources or borrow externally through the IMF, African Development Bank, World Bank and other international lending agencies. With an estimated population of 205 million and GDP of \$448.12 (United Nations, 2019), Nigeria's total public debt as of March 31, 2023, stood at ₦121.67 trillion. Debt Management Office (DMO), March 31, 2023. Government borrows for various important reasons which include the correction of budget deficit. During emergencies, government borrows to attend to befallen calamities. Nigerian government borrowed \$11.3 billion from domestic and external sources to address covid-19 pandemic (Dixit et al. 2020; Osae-Brown, & Soto, 2020). Borrowing becomes inevitable during recession and unemployment. Labor Force Survey highlighted that the unemployment rate in Nigeria has risen to 5% in the third quarter of 2023.

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Government borrows to finance long-term developmental plans and infrastructural build-up. Public debt is a serious issue that poses concern to nations. As the debt crises of Argentina and Greece led a disheartening example to the quick debt-piling nations, Nigerians will never forget the country's unpleasant debt scenarios of the 1980s and 1990s (Abdullahi, 2011). The uniqueness of those years (1980s and 1990s) in the Nigerian history were decades of falling income as a result of fallen price of crude oil, decline in the production and export of agricultural resources and foreign exchange as well as rapid growth in population. In most cases, countries prefer borrowing internally than externally in order to reduce the risk associated with debts. External debts are often accompanied by unfavorable conditions to the borrower nation and consequently results into power transfer from borrower to lender nation (Abdullahi, 2018). Long-term effects of debt burden were deliberated by many scholars. Where some viewed debt as a burden on the posterity, some argued out that it is a fortune to both present and future generations when incurred at unemployment or recessionary period. This is because the impact of increase in employment, output and income is felt by the present generation while the net capital stock of the nation will benefit the posterity (Jinghan, 2011).

Governments borrow more during recessionary periods and reduce debt burden during the periods of economic boom. Where the savings level of the citizen is considered low, public debt acts as a compulsory savings. It also serves as an important source of capital formation of a country. According to Mankiw (2007), government borrowing is seen as future taxes which is equally regarded as current taxes when consumers are forward-looking and think rationally. Therefore, it remains the government's discrete to finance its expenditures either through borrowing or by tax regime manipulation. Traditionalists on one hand, viewed that output is stimulated due to expansion of aggregate demand in a short-run at budget deficit, but capital is crowded and economic growth become depressed in the long-run. Ricardian on the other hand, viewed budget deficit not having any of such effects, since the consumers' understanding on budget deficit is that it stands as tax burden postponement (Mankiw, 2007). One of the tools used by government for economic stability is public debt. The tax-payers' income and consumption levels reduce whenever new taxes are levied by the government in an attempt for debt repayment, but where the borrowed money was spent on the domestic economy, the resultant effect will be increase in income and consumption. However, when it is the production capacity of the economy that was boosted using the borrowed money, employment will increase as well as output (Barro, 1974). The public may conceive an increase in taxes as a consequence of expected revenue growth to bridge the gap in budget deficit, but Ricardian could see it as non-monetary debt or an equivalent to current explicit taxes. When tax regime is low, it may lead to budget deficit. Consumers' spending will increase due to increase in after-tax income. However, the Ricardian considered

consumers' rational expectation as a point of view. Being a forward-looking consumer, he leaves his consumption unchanged since tax reduction today is compensated by future tax increase (Abdullahi, 2018).

Literature Review

The beneficial effect of public debt is experienced on the economy when the money is used to finance public work, yet it results in inflation and other negative effects. Economists define inflation as persistent and appreciable rise in the general price levels of goods and services. In 2023, Nigeria's inflation rate continued its upward trend, reaching 22.79% by June, marking a significant increase from previous months. Earlier in March 2023, inflation was recorded at 22.04%, compared to 21.91% in February, highlighting a steady rise primarily due to factors such as rising food and fuel prices. The year-over-year inflation rate for March 2023 was 6.13 percentage points higher than in March 2022, demonstrating the persistent inflationary pressures faced by Nigeria during this period. These figures are based on reports from the National Bureau of Statistics, which attributes the increase largely to costs in sectors such as food, housing, electricity, and fuel, all of which have substantial impacts on the overall cost of living for Nigerian households. Inflation can be controlled using public debt as a tool. When the government borrows internally, excess liquidity is mopped up from the hands of the public by purchasing government bonds. On a contrast, money spent on government expenditure reintroduces inflation. When there is an attempt for deficit financing, aggregate demand rises in the economy in contrast to aggregate supply, bringing about inflation. When domestic debt is repaid by the government, inflationary condition sets in due to money supply increase in the economy. Government borrowing from domestic banks can also generate inflation since credit availability in the economy increases due to the increase in the availability of bank credit. When the economy is in depression, inflationary circumstance becomes beneficial to private enterprises and results into hardship during prosperous times or war (Lindholm and Driscoll, (1967). When the government sells bond to borrow domestically, individual purchasing power becomes less, thereby resulting to deflation. However, when the money is later spent on public expenditure, inflation sets in

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,

Mbadike and Ikechi (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, Agboegbulem, Mba and Onumonu (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, Abdullahi, Yusuf and Yusufu (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 carried cointegration 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 ARDL long run test also reveals that 1% increase in GDP growth rate brings about 0.12% 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 the increase 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 exists 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 based on government consumption expenditure is positively related with economic growth.

3.0 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 1980 to 2020. They are annual data for 40 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.

$$\text{Model 1:} \quad unem = \alpha + \beta dodb + \gamma exdb + \varepsilon \quad (1)$$

Where,

UNEM = unemployment

DODB = domestic debt

EXTDB = external debt

$$\text{Model 2} \quad infl = \alpha + \beta dodb + \gamma exdb + \varepsilon \quad (2)$$

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. The method 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 method is 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.

4.0 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 Jarque Bera, 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	40	40	40	40

Source: *Author's analysis using Eview*

4.2 Correlation analysis:

The results of the correlation analysis show that inflation is negatively related with unemployment. This goes along with the findings of Igberu, et al. (2016), that 1% increase in inflation rate will bring about 0.2% decrease in unemployment. The study therefore concludes that public borrowing in Nigeria has not created its desired impact in the economy; hence the increase in public debt has not reduced unemployment. This finding sounds contrary to that of the study in some European countries which indicated that unemployment and inflation move together (Salle & Leon, 2014). The correlation results of this study further revealed a negative relationship between inflation and domestic debt but positively related with external debt; while unemployment is positively related with external and internal debts. The findings coincide with the study of Hassan, and Nassar (2015). Their Results showed that public debt or deficit was positively correlated with unemployment. The study concluded that the effect of debt or deficit on unemployment was largely a result of the GDP's negative effect on debt (deficit) and unemployment. In a similar study, the System Generalised Method of Moments (SGMM) was used as the main empirical estimation tool to analyse the role of institutions in the relationship between public debt and unemployment in Sub-Saharan Africa (SSA). The findings from the study indicated that public debt acquisition is not contributing to reducing the unemployment situation in the SSA region. The result in table 2 agrees with the surveyed literature that shows that the relationship between public debt and inflation varies from country to country, with either a positive or negative relationship. However, in the majority of the literature, the link between public debt and inflation tilts towards a positive relationship. This finding is more prominent in indebted countries with higher levels of public debt and a less-developed financial market (Aimola & Nicholas 2020).

Table 2: Correlation Analysis

	UNEM	INFL	EXDB	DODB
UNEM	1.000000			
INFL	-0.170153	1.000000		
EXDB	0.673184	0.099308	1.000000	
DODB	0.908649	-0.227811	0.632310	1.000000

Source: Author's analysis using Eview

4.3 Unit root tests

The result from the unit root test shows 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
EXDB	-1.984107	0.2921
DODB	1.789636	0.9995
UNEM	0.373495	0.9789
INFL	-2.318149	0.1735

Source: Author's analysis using Eview

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). However, in a study that examined the implications of rising public debt on unemployment in Nigeria using ARDL and Wald test econometric analytic tool indicated a long run relationship between public debt and unemployment, that 1% increase in public debt on the average, will bring about 1.6% increase in unemployment rate (Igberi, et al. 2016). However, according to Iwoha (2020), his study found that unemployment granger causes government debt and debt servicing. The overall result of his study shows that public debt has rendered little or no assistance in combating unemployment in Nigeria.

Table 4: Results of granger causality tests

Null Hypothesis:	Obs	F-Statistic	Prob.
EXDB does not Granger Cause INFL	40	0.54591	0.5852
INFL does not Granger Cause EXDB		0.00309	0.9969
DODB does not Granger Cause INFL	40	0.49522	0.6145
INFL does not Granger Cause DODB		0.46824	0.6308
UNEM does not Granger Cause INFL	40	1.35435	0.2740
INFL does not Granger Cause UNEM		0.83170	0.4454
DODB does not Granger Cause EXDB	40	2.98615	0.0662*
EXDB does not Granger Cause DODB		0.78560	0.4653
UNEM does not Granger Cause EXDB	40	3.26489	0.0526**
EXDB does not Granger Cause UNEM		0.06051	0.9414
UNEM does not Granger Cause DODB	40	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 ECM estimated 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 shows that there exists a long run relationship between public debt and unemployment at 10% level of significance. 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), See table 7. In another scholarly article, the existence of cointegration was also confirmed indicating a relationship between public debt and unemployment which turned out to be an inverse relationship. Interestingly for model 2, the result shows no existence of cointegration, meaning there is no long run relationship between public debt and inflation during the period of the study, see table 8. But on the contrary, the cointegrating regression results of another study reveal evidence of a stable long-run relationship between inflation and public debt. The findings also show a positive and significant impact of public debt on inflation. The study confirms the presence of the inflationary effects of public debt in Ghana (Akingbade & Nicholas 2021).

Table 7: Bound Testing for model 1

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

Source: *Authors' analysis using Eview*

Table 8: Bound Testing for model 2

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Sig.	I(0)	I(1)
F-statistic	1.668085	10%	2.63	3.35
K	2	5%	3.1	3.87
		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 devastating effects on unemployment. This means that public debt increases unemployment in Nigeria where external debt increase unemployment the more (see table 9). The result of positive relationship between public debt and unemployment is in line with the findings of Ogonna, Idenyi, Ifeyinwa and Gabriel (2016). Therefore, domestic debt may be considered as an efficient policy action to reach full employment level in Keynesian economics. Monetarists acknowledge that the borrowing by the state to finance public expenditure or to tackle unemployment will create crowding-out effect and

punish the private investments and employment (Bianchi and Presno, 2015). The study by Korol and Cerkas (2015) focusing on Greece should also be mentioned with its conclusion arguing that a 1% increase in public debt increases unemployment rates by 0.46%. Oganna et al. (2016), on the other hand, have analysed the Nigerian economy between 1980 and 2015 and have asserted that 1% increase in public debt would lead to 1.6% increase in unemployment due to the long-term relationship between the two variables.

Public debt increases unemployment (and youth unemployment) in Turkey, Italy and Greece. Similar to numerous studies (i.e. Jimenez and Mishra, 2010; Fedeli and Forte, 2012; Korol and Cerkas, 2015; Kokotovic, 2016; Kurecic and Kokotovic, 2016), these findings do not support the Keynesian thesis that public debt has a positive effect on unemployment.

The result 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

5.0 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. In the case for further research, this study urges that researchers in macroeconomic fields may find it interesting to investigate whether inflation can be used to erode away the piled public debt and its burden in Nigeria.

Contribution: Many researchers sought to tackle the topic of this study. As an effort to contribution to the existing literature, this paper attempted to treat public debt in Nigerian context in 2 different entities: external debt and domestic debt in order to harness the in-depth and true impact of such on unemployment and inflation in each of the 2 models. Similar approach was used by few scholars but outside Nigeria.

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