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Effect of External Debt on Inflation Rate of Nigeria

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Abstract
This study explored the effect of external debt on inflation rate in Nigeria from 1980 to 2019. The study employed the Augmented Dickey-Fuller (ADF) unit root to test, Autoregressive Distributed Lag (ARDL) technique and the stability and diagnostic test in the analysis. The study found that external debt has positive and significant effect on inflation in Nigeria. The research also revealed that real exchange rate and government spending have significant positive relationship with inflation. Similarly, money supply has positive but insignificant impact on inflation in Nigeria. In the contrary, foreign reserve has negative but significant impact on inflation in Nigeria. By implication, a change in any of the explanatory variables will cause fluctuation in the inflation rate in Nigeria. Government must come up with policies and structural reforms to increase the revenue and lower its current expenditure. In addition, commitment to budget should be encouraged for fiscal discipline on the part of the government and its agencies.
Keywords: *External debt, exchange rate, external debt servicing, inflation*

Introduction

The bone of contention regarding the use of debt to finance growth is whether to use domestic debt or external debt. The proponents of domestic debt argue that it is not exposed to exchange rate risk while the proponents of external debt opinion that it is cheaper. Pascal (2010) notes that external debt is

preferable because the interest rates charged on it by international financial institutions such as World Bank, International Monetary Funds (IMF) is about half of that charged on domestic debt. Some others have argued for the use of the right mix of both domestic debt and external debt. However, one of arguments against external debt is that it usually causes exchange rate volatility when it is secured, during its servicing and when it is repaid (Saheed, et al., 2015). Qureshi & Liaqat (2020) argue that high, unsustainable external debt could be risky for developing countries as it could expose them to exchange rate fluctuations, sharp capital outflows, which may cause serious banking or currency crisis. As a matter of fact, if external debt is not well managed it would lead to exchange rate depreciation due to excessive demand for foreign currencies to service and repay the debt. As the value of the local currency falls, there will be exchange rate through to the consumer prices, which consequently leads to high inflation rate (Ogundipe & Egbetokun, 2013).

The extent of the exchange rate pass-through to inflation depends on the size of imports, extent of trade openness, price elasticity of demand, monetary policy stance and so on (Ogundipe & Egbetokun, 2013).

One of the major conditions for the granting of loan to Nigeria by the IMF in the 1980s was the adoption of the Structural Adjustment Programme (SAP). Nigeria's exchange rate in the post SAP era has been rising persistently and very volatile. Although floating exchange rate regime, which was one of the core policies implemented under SAP, allowed for the free determination of the exchange rates by the market forces, this led to series of changes that have substantially affected the trend and stability of the exchange rates. This was aggravated by the crash of oil price at the international market which led to shortfall of foreign exchange earnings and balance of payment problems and external debt crises (Obadan, 2007). These forced the monetary authorities to depreciate the Naira nominal exchange rate gradually (Obadan, 2007). The exchange rate of the Naira has been rising ever since. The average official exchange rate of the Naira which traded at ₦0.893 ($1.00) in 1985 depreciated to ₦2.02 ($1.00) in 1986 and further to ₦8.03 against the US dollar in 1990 (CBN, 2019). By 1999 it had depreciated to ₦92.342 ($1.00). With huge inflow of oil revenue due to hike in the oil price, the end-period rate stood at ₦117.97 in December 2007 (CBN, 2019). By the end of 2016, it had surged pass the ₦200 mark, trading at ₦253.49 ($1.00) due to the historic change in the monetary policy of the Fed in the United States coupled with the crash of crude oil price at the international oil market. As at the end of 2019 the Naira had depreciated to ₦306.92 ($1.00) (CBN, 2019).

It is important that the effect of external debt on inflation rate is

investigated in Nigeria because its economy is highly driven by the external sector, which disposes it to external shocks especially exchange rate fluctuations. Secondly, bulk of the government revenue is in foreign exchange and as such, depends on the exchange rate. Since the Nigerian economy is dominated by public sector, fiscal imbalances would not only affect the fiscal operations of the government but would also affect general price level. Thirdly, the economy relies heavily on the importation of both consumer goods and capital goods. As a result of this, high exchange rate would lead to high prices of imported consumer goods and high cost of production which would also lead to high prices of locally made consumer goods. If the prices of locally made goods become too high, they would lose competitiveness in the global market and thereby reduces the country's exports as well as its foreign earnings. Therefore, it is important for policy makers to be aware of the possible consequences of high external debt on the exchange rate and the consequent through-pass to inflation. As such, this raises the research question: what are the effects of external debts on inflation rate?

Research Problem

Since Nigeria is highly dependent on imports including consumer goods, the high exchange rate has been passed to the consumers in the form of high prices of goods and services. Although the Central Bank of Nigeria introduced inflation targeting from January 2009 into its monetary policy implementation in the bid to curb the high inflation in the country, it has not been successful to a large extent (Obadan, 2007). The country had experienced four major episodes of high inflation since the early 1970s. The first episode was in 1976 when there was drought in the Northern Nigeria that destroyed agricultural produce resulting in drastic price increase in agricultural food items in excess of 30 percent. The second episode was in the 1980s after the Structural Adjustment Program (SAP) when the wage increases caused cost-push inflation. In addition, the pressure from debtors to devalue the Naira before agreement could be reached with the IMF fueled inflation as the exchange rate adjusted to the parallel rate. The third episode was caused by the fiscal expansion that accompanied the 1988 budget as well as the debt conversion exercise that took place during which external debt was repurchased with new local currency obligations. The fourth third episode started in 1993 due to government's expansionary fiscal policy and high money supply growth which has persisted till date. Inflation rate reached 76.8 percent by the end of 1994, the highest rates since the eighties. Although it fell continuously since 1996 due to CBN's stringent monetary policies, it increased to 16.49%in 2001. As a result of the economic recession of 2016, inflation

rate was as high as 18.5% at the end of the year (CBN, 2018). Though it dropped marginally in 2017 and 2018 to 15.3% and 11.4% respectively (CBN, 2018), it was still double digit. It is evident from the foregoing that the inflation rate in Nigeria has been volatile in the past, it necessary to investigate the role of the external debt.

Review of Related Literature

Conceptual Framework

External debt has been described in different ways. According to Ojo and Sulaiman (2012), external debt is the financial obligation that of one party (debtor country) to another (lender country). United States Department of the Treasury (2010) defined external debt as the accumulation of the debts owed by the central government and all the federal states of a country. Inflation in the other hand, described as general increase in the Consumer Price Index (CPI), which is a weighted average of prices of a basket of different goods. The set of goods that make up the index depends on the goods that are considered to be commonly consumed goods. Therefore, the composition of the goods that make-up the index varies from one country to another depending on the consumption habits of majority of the population. The prices of some of the goods that are considered may drop while the prices of others may rise, the overall value of the CPI will depend on the weight of each of the goods with respect to the whole basket. Annual inflation rate is usually calculated as the percent change of the CPI compared to the same month of the previous year.

Theoretical Review

Purchasing Power Parity

Purchasing power parity (PPP) is a theory of long-term equilibrium exchange rates that is based on the relative price levels of two countries. It is the starting point for empirical exchange rate analysis, which in absolute terms states that the "law of one price" for prices of goods holds across countries. The law of one price says, in the absence of any limitation to international trade such as transportation costs and tariffs, homogeneous goods should be sold at same price in both home and foreign country, when converted at the market exchange rate (MacDonald, 2007).

In its "absolute" version, the purchasing power of different currencies is equalized for a given basket of goods. In the "relative" version, the difference in the rate of change in prices at home and abroad i.e. the difference in the inflation rates, is equal to the percentage depreciation or appreciation of the exchange rate. Deviations from the theory imply differences in purchasing power of a "basket of goods" across countries which means that for the purposes of many international comparisons, countries' GDPs or other national income statistics need to be "PPP

adjusted" and converted into common units. The real exchange rate is then equal to the nominal exchange rate, adjusted for differences in price levels. If purchasing power parity holds exactly, then the real exchange rate would always equal one. However, in practice the real exchange rates exhibit deviations from this value in both the short run and long run (MacDonald, 2007).

The theory of purchasing power parity (PPP) can be applied in practice by using data on purchasing power parity exchange rates, where the PPP exchange rate is defined as the number of units of a country's currency required to purchase the same basket of goods in that country as one unit of the numeraire currency would buy in another country. Absolute PPP, by itself, seems to provide a rather poor guide for judging the "fair" exchange rate level. A possible alternative is the relative PPP that has less strict condition as it requires that the inflation differential at home and abroad is reflected by a corresponding change in the nominal exchange rate. Given this condition, the real exchange rate would be constant if the relative PPP is the only factor driving the fluctuations in the nominal exchange rate.

Against the background of the conditions of the PPP, which are also its shortcomings, there are alternative measures of exchange rate equilibrium which can be used for assessment purposes. One of these measures is the monetary approach to exchange rate determination, which is an extension of PPP. According to MacDonald (2000), this approach endogenises the price determination in two countries based on supply and demand for money. Two other approaches have been more prominent in recent literature on equilibrium exchange rates of emerging market of the central and eastern European countries and they are the fundamental equilibrium exchange rate (FEER) approach, advocated by Williamson (1994), and the behavioural equilibrium exchange rate approach (BEER), initially proposed by Clark and MacDonald (1999).

Theories of Inflation

There are three theories that explain the cause of inflation; they are the quantity theory of money, Keynesian theory, and neo-Keynesian theory. The quantity theory of money is the basis of the classical school of thought or monetarists views of inflation while the Keynesian theory is the foundation of the neoclassical school of thought or structuralists view. The quantity theory of money was developed by a famous American economist, Irving Fisher (1911), who propounded that if there is a change in the quantity of money in circulation there would a corresponding and proportionate change in price level (Sa'idu & Muhammad, 2015). The monetarists view inflation from the supply side. They argue that the problem of inflation is a monetary phenomenon which according to them means that

there will be increase in the general price level when there is too much money in circulation chasing few goods (Olalere, 2016). This means that if money supply is too high, there will be excess demand which would force the prices of goods up. This is called demand-pull inflation.

However, Keynes (1936) argues that changes in money supply may not necessarily lead to changes in the general price level. According to him, changes in money supply would lead to appropriate changes in interest rate either way, which would affect investments and subsequently leads to appropriate changes in income, employment and output that would nullify the effects of the changes in the money supply (Sa'idu & Muhammad, 2015). The structuralists view inflation from the supply side. They argue that if there are structural inefficiencies in the system, then there will be no equivalent changes in income, employment and output in reaction to changes in money supply. Hence, the Keynesian school of thought submits that inflation is not a monetary phenomenon rather a structural phenomenon caused by structural rigidities such as deficient infrastructure, insecurity, shortage of manpower, lack of technical know-how etc that impede productivity and as such, causes high cost of production. This is passed on to the consumers in form of high prices. This is called cost-push inflation.

The neo-Keynesian theory combines the views of both the classical school of thought and the Keynesian school of thought. The proponents of this school of thought view inflation from both the demand side and the supply side. They adopt the Keynesian view in the short-run and the classical view in the long-run (Sa'idu & Muhammad, 2015). They argue that in the short-run, public expenditure and nominal money supply is constant and aggregate demand which is equal to aggregate supply increases with real money supply but decreases with general price level, as such, inflation does not occur, However in the long-run, decreases in output level is an indication of diminishing returns to scale, which generates inflationary pressure due to over-heating of the economy and enlarging gap (Sa'idu & Muhammad, 2015).

Empirical Literature

Yien, *et al.*, (2017) attributed the high inflation that Malaysia witnessed since 1974 to oil price shock and imported food. The problem was aggravated by the high level of external debt and domestic debt of the country which was caused by the government's expansionary fiscal policies. To verify this assertion, Yien, *et al.*, (2017) applied exploratory data analysis, non-parametric approach, unit root test, Co-integration, and Granger-causality test to investigate the dynamic relationship between external debt, domestic debt, inflation and exchange rate between 1960 and 2014. The variables included in the analysis are

consumer price index, domestic debt, external debt and exchange rate. One of the findings shows that rising external debt exert pressure on the exchange rate, which consequently leads to significant increase in inflation rate. This study is significant because it exposes the exchange rate risk of external debt and its pass-through effect of local prices. Therefore, it helps policy makers to focus on external pressures during high-inflation periods. The finding of the study is significant because a robust methodology was used. Also, Mweni, Njuguna and Oketch (2016) applied Augmented Dickey-Fuller (ADF), heteroskedasticity, Autoregressive Conditional Heteroskedasticity (ARCH), autocorrelation and normality were done to ensure the data does not violate the assumptions of classical linear regression model (CLRM) and ordinary least square regression to investigate the effect of external debt on inflation rate in Kenya from the 1972-2012. The study revealed that external debt and inflation showed that external debt and inflation are negatively correlated; with a Spearman's correlation. The results also showed that external debt has a positive and significant effect on inflation. However, Mweni, *et al.*, (2016) concluded that there is a significant effect of external debt on inflation. Using Augmented Dickey-Fuller (ADF) test, co-integration test and Error Correction Model (ECM), Ezeanyeji, Imoagwu and Ejefobihi (2019) examined the relationship between public debt and inflation in Nigeria from 1981 to 2017. The research finding indicated that public debt, exchange rate and money supply have positive and significant impact on inflation in Nigeria. Moreso, real GDP growth rate has negative and statistically insignificant impact on inflation in Nigeria.

Odera (2015) contends that the size of external liabilities is major contributing factor of exchange volatility stressing that high exposure to large external liabilities magnifies the rate of exchange rate depreciation especially if the external debt is dominated by public debt. To confirm this, Odera (2015) investigated empirically, the impact of external public debt on real effective exchange rate (REER) volatility under flexible exchange rate regime using Ordinary Least Square technique with data spanning from 1993 to 2013. The analysis was based on Devereux and Lane (2003) model while the variables considered are standard deviation of the moving average of real effective exchange rate, trade openness, inflation, interest rate, GDP growth rate, money supply to GDP ratio and external debt. It was found that external public debt has a significant negative effect on exchange volatility meaning that high external public debt aggravates exchange volatility especially in the absence of prudent debt management strategies. This finding is significant for policy formulation in the management of

external public debt. It underscores the need for external debt sustainability. One of the limitations of this study is that the estimation of the model was limited to just two trading partners of Kenya – US and UK due to lack of quarterly data for other trading countries. Another limitation is that few of determinants of exchange rate were included in the model formulation. The study could have been more comprehensive if more countries and other debt sustainability indicators were included in the analysis. Furthermore, using vector autoregressive technique, Johansen approach, Granger causality tests, impulse response functions, and forecast error variance decompositions, Ameyaw (2015) investigate the relationship and the direction of causality between the public debt, inflation and the exchange rate in Ghana from 1990 to 2013. The empirical results found a long-run relationship running from inflation and exchange rate to the public debt ratio with no feedback from the public debt to inflation and the exchange rate in the long run. In the short-run, while the study found a negative significant relationship between inflation and the public debt, no strong relationship was found to exist between the public debt and exchange rate in the short run. One channel of unidirectional causality was found in the short run, actively running from inflation to public debt. All the impulse response functions of shocks to the variables were found to be permanent over time which was reinforced by the level effects (estimated using cumulative impulse response functions). The diagnostic test confirmed the validity of the model and CUSUM and CUSUMSQ test revealed the stability of the model.

Research Gap

Based on the literature reviewed in the previous section, it is evident that several works have examined the effect of external debt on inflation in both developed and developing countries including Nigeria. Most recently, Ezeanyeji, Imoagwu and Ejefobihi (2019) covered the period of 1981 to 2017. The timeframe of previous studies seen by the researchers in the literature are shorter periods than the period of the present study. However, this study contributes to the current debate but differs from the previous studies by using a fairly large period of time from 1981 to 2019 in analyzing the effect of external debt on inflation in Nigeria.

Research Methodology

Theoretical Framework

The monetarist view of inflation was championed by Milton Friedman and other monetary economists. They argue that inflation is a monetary phenomenon since they believe that inflation is caused by excess money supply. This can be illustrated by Irving Fisher's quantity theory of money which is stated below thus:

$$MV = PQ \quad \text{---------- (1)}$$

Where M - Money supply
V - Velocity of money
P - Price level
Q - Real Output level

It is assumed that the economy is at full economy so that V and Q is constant in the short run.
Therefore;

$$M\overline{V} = P\overline{Q} \quad \text{------ (2)}$$

Hence, at full employment, the general price level is influenced by the money supply. It is believed that higher money supply when all the factors of production are full engaged would lead to generation increase in the prices of goods and services and vice versa. Since external debt is an injection in the economy, it would increase the money supply, which would consequently lead to inflation according to the monetarist's argument. Therefore, theoretically, external debt is expected to lead to higher inflation rate, ceteris paribus.

Model Specification

The model aims to achieve the effect of external debt on inflation rate in Nigeria. The formulation of the model was based on the works of Mweni, Njuguna and Oketch (2016) which were also modified to in order to include other variables such as inflation rate, external debt, exchange rate, money supply, government spending and foreign reserve. The functional form of the model can be stated thus:

$$INF = f(ED, REER, MS, GS, FR) \text{--(3)}$$

The econometric form of the model is stated below as:

$$INF = \beta_0 + \beta_1 ED + \beta_2 REER + \beta_3 MS + \beta_4 GS + \beta_5 FR + \mu \text{----------(4)}$$

The logarithmic conversion of the model yields the structural form stated below:

$$INF_{t-1} = \beta_0 + \beta_1 ED_t + \beta_2 REER_t + \beta_3 MS_t + \beta_4 GS_t + \beta_5 LnFR_t + \mu_t \text{----------(5)}$$

Where:
INF = Inflation rate, measured by annual year-on-year inflation rate
ED = External debt stock in previous year measured as ratio of GDP
REER = Real effective exchange rate
GS = Government spending as percentage of GDP
MS = Money supply (% of GDP)
LnFR = Natural logarithm of foreign Reserve β_0= Constant
$\beta_1 - \beta_5$ = Estimation parameters μ_t = Stochastic error term
t = Time period (1980-2019)

A priori expectation: $\beta_0 > 0$, $\beta_1 > 0$, $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 < 0$ and $\beta_5 < 0$. Again, it is expected that the estimation parameters would turn out with signs and magnitude that would conform to economic theory. According to theoretical explanation, it is expected that external debt stock would have direct impact on inflation rate while real exchange rate, money supply, government expenditure and foreign reserve are expected to have negative impact on inflation rate in Nigeria.

Method of Analysis and Sources of Data

As a contribution to existing literature, this study broadens the analytical framework by applying ARDL approach for cointegration to estimate the parameters of the regression model in combination to confirm the long run relationship among the variables in the model. The Augmented Dickey Fuller (ADF) unit root test was used to hedge against spurious regression. The data analysis was restricted to the period from 1980 to 2019. It was during this period that the country experience severe debt crises, volatile exchange rate. Although there are various econometrics techniques that can be used estimate the parameters in the economic relationships based on statistical observations (Koutisyannis, 2003), the ARDL approach for cointegration was employed in this study. There are a number of reasons for adopting this approach. Firstly, the parameter estimates derived through adopting ARDL have some optimal properties (Blue Properties i.e. Best, Linear, Unbiased and Estimates). Secondly, the computational procedure of ARDL is simple compared with other Econometric techniques. Besides, the data requirements are not excessive. Thirdly, ARDL is an essential part of most other estimation techniques.

Secondary data are used in this study. They were sourced mostly from the publications of the Central Bank of Nigeria (CBN) such as CBN Statistical Bulletin (2019); as well as the publications of Debt Management Office (DMO), and World Bank. The variables for which data were sourced include: inflation rate, measured by annual year-on-year inflation rate, external debt stock in previous year measured as ratio of GDP, real effective exchange rate, Government spending as percentage of GDP, money supply (% of GDP) and foreign reserve for the period between 1980 and 2019. The econometric software packages used for the analysis are the E-View 9 software, while Microsoft Excel 2007 was used to prepare the data for analyses.

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

Descriptive Statistics

Descriptive statistics are used to describe the main features of the data set which include measures of central tendency (mean, median, and mode); measures of variability (standard deviation, variance); the minimum and maximum values of variables (kurtosis and skewness) providing summary of samples and observations which forms the basis for the description of the data set. The table 4.1 and figure 4.1 below showed the descriptive statistics of the models and trends between 1980 and 2019.

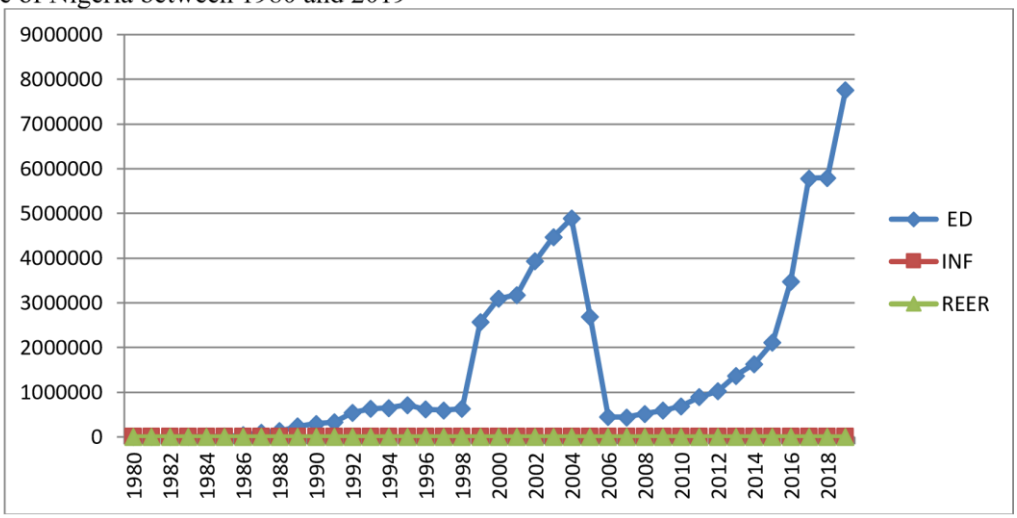
Table 4.1 Summary of Descriptive Statistics of Variables

Mean	INF	ED	REER	MS	GS	LnFR
Median	19.58500	34.53925	66.66206	15.05550	3.680250	2.148171
Maximum	12.90000	25.05500	76.34591	12.69500	2.085000	2.037875
Minimum	76.80000	120.8400	154.2900	25.16000	9.450000	3.981549
Std. Dev.	0.200000	4.080000	0.041573	9.150000	0.910000	-0.072571
Skewness	17.85344	30.56778	46.57903	5.224736	2.820890	1.387335
Kurtosis	1.723215	0.894114	-0.058168	0.725771	0.834656	-0.080511
	5.063479	3.101517	1.998849	1.887815	2.228230	1.493670
Jarque-Bera	26.89304	5.346780	1.693064	5.573219	5.637050	3.824928
Probability	0.000001	0.069018	0.428900	0.061630	0.059694	0.147716
Sum	783.4000	1381.570	2666.482	602.2200	147.2100	85.92683
Sum Sq. Dev.	12431.07	36441.17	84614.65	1064.617	310.3395	75.06324
Observations	40	40	40	40	40	40

Source: Author's Compilation Using E-views 9 Output

The table 4.1 revealed the statistical analysis of the variables – inflation rate (INF), external debt stock (ED), real effective exchange rate volatility (REER), Government spending (GS), money supply (MS), foreign Reserve (LnFR) with their respective mean of 19.58, 34.53,66.66, 15.05, 3.68, and 2.14 which is the sum of all the values in the data group divided by the total number of the values and their respective standard deviation of 17.85, 30.56, 46.57, 5.22, 2.82 and 1.38 which is the positive square root of the variance. The study indicates that exchange rate volatility (REER) and foreign reserve (LnFR) has negative skewness meaning that long left tail, that is, lower value than the sample mean. The inflation rate (INF), external debt stock (ED), money supply (MS), Government spending (GS) were all positively normal skewed and platykurtic (because 1.7, 0.89, 0.72, 0.83<3 respectively). Again, the Jarque – Bera statistic revealed that inflation rate (INF) the probability value is less than 0.05 level of significance, indicating rejection of null hypothesis of normal distribution because the probability value is highly statistical significance, which means that, inflation rate is not normally distributed. Again, the probability value of external debt stock (ED), exchange rate volatility (REER), money supply (MS), Government spending (GS), foreign reserve (LnFR) were above the significance level of 0.05, indicates that we cannot reject null hypothesis because is normally distributed curve. The figure 4.1 showed the trend of external debt stock, real effective exchange rate (REER) and inflation rate of Nigeria between 1980 and 2019.

Figure 4.1: The Trend of External Debt Stock, Real Effective Exchange Rate (REER) and Inflation Rate of Nigeria between 1980 and 2019



Source: Eview 9 Output

Figure 4.1 shows the trend of the external debt, Real Effective Exchange Rate (REER) and inflation rate between 1980 and 2019. A glance at the chart reveals that there is no definite pattern between them. The inflation rate was very volatile between 1980 and 1995 while REER fell consistently. Inflation rate has been relatively stable since 1999 as a result of the stringent monetary policies of the CBN. The REER rose consistently between 1995 and 2006 due to the favourable macroeconomic environment and the return of democratic rule. However, it has been falling since 2007 due to series of economic and socio-political crises caused by fiscal imbalance, Niger Delta militancy, Boko Haram insurgency and so on.

Unit Roots Test Result

This was implemented using the conventional – Augmented Dickey-Fuller (ADF) unit root test. For convenience, table 4.2 is a tabular presentation of the abridged unit-root test carried out on the variables.

Table 4.2: Abridged ADF Unit Root Test for the models respectively

Variables	ADF-Statistic	Critical Value			Order of Integration	Durbin-Watson stat.
		1%	**5%**	**10%**		
INF	-5.874918	-3.615588	-2.941145	-2.609066	1(1)	1.911782
ED	-5.885366	-3.615588	-2.941145	-2.609066	1(1)	1.997246
REER	-4.285925	-3.615588	-2.941145	-2.609066	1(1)	1.950977
MS	-5.976211	-3.615588	-2.941145	-2.609066	1(1)	1.999590
GS	-5.674202	-3.621023	-2.943427	-2.610263	1(1)	1.972086
LnFR	-4.713652	-3.610453	-2.938987	-2.607932	1(0)	1.453836

Source: Author's Compilation with the use of *E-views 9 Output*

A result of diagnostic test for unit root is presented in table 4.2 above. The result indicates in the model, that foreign reserve (LnFR) is stationary at levels, that is 1(0), while inflation (INF), external debt stock (ED), real effective exchange rate volatility (REER), money supply (MS) and government spending (GS) were stationary at first difference, that is 1(1). Moreover, to confirm the reliability of this result, the Durbin Watson statistic value at each point is significant at approximately 2.00. This also shows the absence of traits of autocorrelation in the time series data in the respective models. Therefore, we can safely go ahead with the bounds test. Consequently, this research would employ the ARDL – Bound testing method of co-integration analysis rather than the Johansen method.

The Results of ARDL Cointegration Test

Given the unit root test result above, the most appropriate co-integration test is the Pesaran Bounds test since the test allows combination of fractionally integrated variables that is, combines variables of different orders of integration. The critical value of the ARDL Bound testing depends on selected lag length; for this reason, the optimal lag (p) was determined empirically based on Hannan Quinn Criterion (HQC). The critical values reported in Pesaran, *et al*., (2001) are equally adopted. The table 4.3 abridged of ARDL bound tests for the models respectively.

Table 4.3: Abridged ARDL Bound Tests

Null Hypothesis: No Longrun Relationsh ips Exist		
Test Statistic	**Value**	**K**
F-statistic	6.060935	5
Critical Value Bounds		
Significance	10 Bound	11 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Author's Compilation Using E-views 9 Output

From the result from table 4.3 above, it can be viewed that the bound test F-statistics of the model is 6.060935 were greater than the upper bound critical values of both the lower and the upper bounds at all level of significance. This indicates that there is a unique long run relationship among the variables. In other words, the calculated F-statistic exceeds the upper critical bound. Therefore, the null is rejected and the alternative hypothesis of the existence of a long-run relationship accepted. Hence, the null hypothesis of no long-run relationship shall be rejected based on this empirical finding.

Estimation of Long-run Elasticities and Short Run Dynamics

How has external debt affected inflation rate in Nigeria? The table 4.4 showed abridged of estimated long-run and short – run parameters of the ARDL (2, 2, 1, 1, 1, 0).

Table 4.4 Abridged Estimated Long-run and Short-run Coefficients based on ARDL (2, 2, 1, 1, 1, 0) for the Model

	Regressor	Coefficient	Std. Error	t-Statistic	Prob.
Long-run	ED	0.566138	0.075011	7.547421	0.0000*
	REER	0.151425	0.064731	2.339292	0.0276*
	MS	0.231872	1.089317	0.212860	0.8332
	GS	6.612009	1.846692	3.580460	0.0014*
	LnFR	-18.695733	4.307997	-4.339774	0.0002*
	C	-4.088586	10.934292	-0.373923	0.7116
	R-squared = 0.6 79936 Adjusted R-squa red = 0.461711 F-statistics = 3.1 15751 Prob (F-statistics) = 0.007758 Durbin Watson = 2.401932				
Short-run	D(INF)	0.223411	0.126929	1.760130	0.0906
	D(ED)	-0.008708	0.129523	-0.067232	0.9469
	D(ED(-1))	-0.421301	0.130740	-3.222426	0.0035*
	D(REER)	0.023136	0.090592	0.255387	0.8005
	D(MS)	1.464273	1.090536	1.342710	0.1914
	D(GS)	3.744817	1.447758	2.586632	0.0159*
	D(LnFR)	-17.681501	3.186334	-5.549168	0.0000*
	CoinEq(-1)	-0.945751	0.136008	-6.953643	0.0000*

Source: Author's Compilation Using E-views 9 Output

Note: * denote statistical significance at the 5% level.

From the results of the third regression, the long – run, it demonstrates that constant term is 4.088586 and this implies that inflation rate (INFR) increase by about 408.8% when other predictor variables are assumed to be zero. This implies that value is negative and statistically insignificant with p-value of 0.7116 which is greater than 0.05% level of significance. Although the negative coefficient of constant term does not have any economic meaning, it meets our a priori expectation.

For the external debt (ED), real exchange rate (REER) and government spending (GS) on the other hand, the coefficient revealed significant positive relationship with inflation at 5% level. Similarly, money supply (MS) has positive but insignificant impact on inflation in Nigeria. By

implication, a change in any of the explanatory variables will cause fluctuation in the inflation rate in Nigeria. For instance, a percentage change in the ED, REER, GS and will fluctuate inflation rate by 56.6%, 15.1%, 661.2% and 23.18% respectively. In the contrary, foreign reserve (LnFR) has negative but significant impact on inflation in Nigeria. This finding is confirmed with the a priori expectation of this study. This means that 1% increase in LnFR in Nigeria will result into 1869.57% will reduce in the level of inflation.

In the short run, external debt D(ED) has negative and insignificant impact on inflation in Nigeria. More so, the lagged one period of external debt D(ED(-1)) and foreign reserve D(LnFR) has negative but significant impact on inflation in Nigeria. This indicates that one percent increase in D(ED), D(ED(-1)) and D(LnFR) will reduce inflation in Nigeria by 0.87%, 42.1% and 1768.15% respectively. In the contrary findings, the real exchange rate D(REER) and money supply D(MS) are positively but insignificant related to inflation rate in Nigeria. Similarly, government spending D(GS) has positive and significant impact on inflation in Nigeria. During the short run, 1% rise in D(REER), D(MS) and D(GS) will increase the level of inflation rate 2.3% and 146.4% respectively.

However, the coefficient of determination (R^2) is the summary measure that tells us how well the sample regression line fits the data. From the model three above, R^2 of 0.679936 this implies that having removed the influence of the explanatory variables, the dependent variable is still explained by the equation with 67.99%, and the remaining 11.3% was explained by variables not included in the model. The adjusted R^2 takes account of more number of regressors if included and it still explains 46.17% variation in the dependent variable. The goodness of fit of the regression is low after adjusting for the degree of freedom. The *f*-statistics of 3.115751, which is a measure of the joint significance of the explanatory variables, is found to be statistically significant at 1 percent level as indicated by the corresponding probability value 0.007758. This indicates that the model is of good fit and some variables are insignificant. The value of Durbin Watson is 2.401932 in the model. By implication, there is absence of autocorrelation between the dependent variable and predictors variables in Nigeria. The coefficient of the CointEq(-1) as could be observed in table 4.4 is negative, and highly significant, showing that the model has a self-adjusting mechanism for adjusting the short-run dynamics of the variables with their long – run values. The speed of adjustment to equilibrium is given by the coefficient of CointEq(-1) as -0.945751. This speed is very high, indicating that a deviation of inflation from equilibrium is corrected by as high as 94.57% the following year. According to Bannerjee, Dolado and

Mestre (1998); Afolabi and Oluyemi (1995) "a highly significant lagged CointEq (-1) is further proof of the existence of stable long-run relationship". This implies that the adjustment to restore long-run equilibrium is reasonably high.

Policy Implications of the Research Findings

The research finding demonstrates in the long-run that external debt has significant positive impact on inflation in Nigeria. Although this research finding is not conformity with the a priori expectation of this study. This aligns with the findings of Ezeanyeji, Imoagwu and Ejefobihi (2019) who revealed that public debt has positive and significant impact on inflation in Nigeria.

The implication this finding may be that when government borrows directly from central bank to finance its expenditures, money supply increases then price level increases as explained in theory of demand-pull inflation. Again, the cost of borrowing is a huge burden on budget and to finance budget deficit government has to resort to different sources and deficit financing leads to decrease in value of currency, ultimately creates inflation. Furthermore, the reason of this result may be that if there is a depreciation/devaluation in the value of currency, our exports would become cheaper for abroad, but our imports would appear to be more expensive if Marshall-Learner conditions are satisfied.

Conclusion

It was also found that external debt has significant positive impact inflation rate in Nigeria. Since the external debt and the debts servicing cause the exchange rate to rise, these create inflationary pressure because Nigeria is imports dependent. As such, the burden of high exchange rate would be transferred to the consumers in the form of high prices which leads to inflation. However, Government must come up with policies and structural reforms to increase the revenue and lower its current expenditure. The rise in public debt in Nigeria is attributed to government extra budgetary activities which most often are not used for the proposed project. Commitment to budget should be encouraged for fiscal discipline on the part of the government and its agencies.

References

Ameyaw, E. (2015). *The dynamics of public debt, inflation and exchange rate in Ghana: A vector autoregressive analysis*. This Thesis is submitted to the University of Ghana, Legon in Partial Fulfillment of the Requirement for the Award of Mphil Economics Degree.

Central Bank of Nigeria (2019). *Central Bank of Nigeria Statistical Bulletin*. Abuja: Central Bank of Nigeria.

Central Bank of Nigeria (2018). *Central Bank of Nigeria*

Statistical Bulletin. Abuja: Central Bank of Nigeria.

Clark, P.B. & MacDonald, R. (1999). Exchange rates and economic fundamentals: A methodological comparison of BEERs and FEERs. In R. MacDonald and J Stein (eds) Equilibrium *Exchange Rates*, Kluwer: Amsterdam. And IMF Working Paper 98/67 (Washington: International Monetary Fund, March 1998).

Ezeanyeji, C.I., Imoagwu, C. P. & Ejefobihi, U.F. (2019). Public debt and inflation in Nigeria: An econometric analysis. *International Journal of Applied Research*, 5(3), 219-224

Koutsoyiannis, A. (2003). *Modern microeconomics* (Second Edition). Macmillan Press Ltd.

MacDonald, R. (2007). *Exchange Rate Economics: Theories and evidence*. London and New York: Routledge.

Nwanne, T. F. I. & Eze, O. R. (2015). Assessing the effect of external debt servicing and receipt on exchange rate in Nigeria. *International Journal of Economics and Finance*, 7(9), 278–286.

Obadan, M. I. (2007). Exchange rate policy design: Choosing the right exchange rate response in a changing environment. *CBN Economic and Financial Review*, 45(4), 143-163.

Odera, Q. A. (2015). *An analysis on the effect of external public debt on exchange rate volatility in Kenya* (Master's thesis). Economic Policy and Management, University of Nairobi, Kenya.

Ogundipe, A. A. & Egbetokun, S. (2013). Exchange rate pass-through to consumer prices in Nigeria. *European Scientific Journal*, 9(25), 110-123.

Pascal, M. (2010). External borrowing - a solution in overcoming the current economic crisis? *CES Working Papers*, 2(2):5-10.

Pesaran, M.H., Shin, Y. & Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3),289 –326.

Qureshi, I. & Liaqat, Z. (2020). The long-term consequences of external debt: Revisiting the evidence and inspecting the mechanism using panel VARs. *Journal of Macroeconomics*, 63: 1-19.

Saheed, Z. S., Sani, I. E. and Idakwoji, B. O. (2015). Impact of public external debt on exchange rate in Nigeria. *European Journal of Business and Management*, 7(21), 51-57.

Sulaiman, L. A. & Azeez, B. A. (2012). Effect of external debt on economic growth of Nigeria. *Journal of Economics and Sustainable Development*, 3(8), 71-79.

Yien, L. C., Abdullah, H. & Azam, M. (2017). Granger causality

analysis between inflation, debt and exchange rate: Evidence from Malaysia. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 7(1), 189-196.