The Causal Relationship between Government Expenditure and Inflation in Nigeria: Smooth Transition Regression Approach

Abstract

This paper revisits the nexus between government spending and inflation in Nigeria using a Smooth Transition Regression model (STR) to investigate both the linear and nonlinear effects of the former on the latter from 2000: 1 to 2023:6. The monthly data sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin (2023) are used. The study reveals that linear approximation fails to adequately explain the non-linear effects of government spending on inflation, particularly in high-growth regimes financed by the central bank. It is suggested that in a low-growth regime where government spending is not financed by the central bank, avenue should be given to fiscal policy to stimulate and control inflation.

Keywords: Relationship, Government Expenditure, Inflation, STR, Nigeria

1.0 Introduction

Economists have studied inflation causes and sources, but the relationship between inflation and macroeconomic variables like government expenditureremains debated, whereas, Keynesian views suggest government spending as prerequisite for economic stability, productivity and investment(Attari, and Javed, 2023). Nigeria, Africa's largest economy, is shaped by natural resources, population growth, fiscal challenges and inflation (Babalola and Oyeyemi, 2023). Government expenditure significantly influences economic outcomes, with debates surrounding its impact on inflation.Understanding Nigeria's economic history, including past inflation episodes and government spending is crucial as researchers like Ebisine and Oki, (2021) have studied inflation dynamics in historical contexts.

The literature on the relationship between government expenditure and inflation in Nigeria is complex, influenced by factors like oil dependency, political dynamics, and fiscal policies. Thecountry's heavy reliance on oil revenue impacts government expenditure and inflation, underscoring the resource curse hypothesis, suggesting higher inflation in resource-dependent

economies like Nigeria is due to fiscal profligacy (Dikeogu, 2018). Exploring the impact of political cycles and election-related spending on Nigerian inflation is helpful in highlighting the need for further investigation into this aspect (Ejiogu, 2020**).**Empirical debates on the causal relationship between Nigerian government expenditure and inflation have yielded mixed results, with some suggesting a positive correlation and others emphasizing the need for fiscal and monetary policy control (Ezeoke and Emeka (2021).

Most extant studies such as Oyerinde, (2019)andOkeke, Ohazulume, Emerenini, (2022)investigate the causality between government expenditure and inflation in Nigeria, using Granger causality tests, resulting in contrasting positive and reverse causality.The use of Structural Vector Autoregression (SVAR) models to analyze the dynamic interactions between government expenditure and inflation in Nigeria, providing a comprehensive understanding of the causal relationship, dominate the literature.

Also,Nwamuo, (2022) explores the impact of oil price shocks on Nigeria's economy, highlighting its sensitivity to global oil price fluctuations while Ezeoke and Emeka (2021) use political business cycle theory to investigate the impact of election-related spending and political factors on Nigerian inflation.Another strand of literature emphasizes the need for coordination between fiscal and monetary policies to mitigate inflationary pressures, focusing on the interaction between monetary policy and government expenditure.The debate on fiscal or monetary policy's role in Nigerian inflation persists, with some arguing fiscal dominance due to excessive government spending and others arguing central bank policies' importance.Nigerian economy has been plagued by high inflation for the past decades, impacting individuals and economic variables. Understanding the root causes can help authorities design effective policies. Government spending is crucial for economic stability, productivity enhancement, and income redistribution.

This paper revisits the relationship between government expenditure and inflation in Nigeria, a nation with diverse economic landscapes and history of inflation. It aims to determine if there is a causal relationship, crucial for policymakers seeking economic stability and sustainable growth. It also explores the composite relationship between government expenditure and inflation in Nigeria, focusing on the country's unique economic history, governance, and

challenges. It aims to contribute to understanding how government expenditure influences inflation dynamics in a developing economy.

The 2008 financial crisis prompted economists to consider fiscal policy as a tool for economic stabilization. However, the effects on emerging markets and developing countries like Nigeria are unclear and assume linearity. Also, if the prevailing association between variables is nonlinear, the use of linear model could result in ambiguous conclusions (Kocaarslan and Soytas, 2019). That is why, according to Lee and Persaran, (1998), there have been considerable interests in nonlinear model in economics in recent time.This study aims to explore the relationship between inflation and government expenditures in Nigeria using a non-linear approach, and specifically the impact of government spending on inflation is examined by the use of Smooth Transition Regression (STR) model.

2.0 Literature review

Effect of government expenditure on inflation in Nigeria cannot be over-emphasised. Fasewa and Aderinto , (2023) investigates the impact of government expenditure on Nigeria's inflation over 38 years, using secondary data from the Central Bank of Nigeria Statistical Bulletin. The results of the study show a negative relationship between government capital expenditure and inflation, while recurrent expenditure has a positive relationship. The study recommends maintaining a strategic balance between capital and recurrent expenditure to prevent consumption-based economic growth.

There exist a long a long-term relationship between public expenditure and inflation in Nigeria with government expenditure on transport and communication having a positive but insignificant relationship on inflation (Ebisine and Oki, 2021). The findings of the studies also show that other government expenditures, such as defense, agriculture, education, and health, are found to have negative effects. The study recommends effective government channeling of public funds for price stability and coordination of consumption spending to prevent crowding out.

Government aims to maintain stable domestic price levels to avoid inflation. Therefore, Toriola, Adebosin, Oyewole and Aberu, (2022) examine the relationship between monetary inflation and fiscal spending in Nigeria, using data from 1981 to 2016. Results show that government capital

spending has a significant negative effect on monetary inflation, while money supply has a positive effect. However, government recurrent spending doesn't affect inflation. The study suggests that inflation doesn't grow with fiscal spending growth, suggesting that government fiscal spending hasn't reached a level to stimulate inflation. The government should discourage non-productive expenditures and revitalise contractionary monetary policy and economic diversification to stabilize inflation rates.

The empirical study of Dikeogu, (2018) analyzes the impact of public spending on inflation in Nigeria from 1980 to 2017. It uses data from the Central Bank of Nigeria's Statistical Bulletin and uses Auto Regressive Distributed Lag to analyze the relationship. Results show that government capital spending negatively impacts inflation, while recurrent spending has both positive and negative effects. The paper recommends channeling expenditure towards infrastructural development and efficient monetary policy instruments.The relationship among government expenditures, economic growth and inflation in OECD countries assumes another dimension as the relationship is found to have a bidirectional causality between economic growth and inflation, and a unidirectional causality from inflation to government expenditures and from government expenditures to economic growth (Korkmaz and Güvenoğlu, 2021). It is therefore suggested that governments can make use of fiscal policy tools to achieve their top priorities.

In a similar study, Campbell, Oluwatosin and Ojo, (2022)investigate the causal relationship between public expenditure, employment, and economic development in Nigeria from 1985-2019. It finds that despite government expenditure increasing, it doesn't lead to increased employment or improved economic development. The results suggest a bidirectional causal relationship between employment and economic development, but public expenditure has a unidirectional causal relationship with employment.

Also, Attari, and Javed, (2023) examine the relationship between inflation, economic growth, and government expenditure in Pakistan from 1980-2020. Using time series data, econometric tools like ADF unit root test, ARDL, Johansen cointegration, and Granger-causality test were used. Results show a long-term relationship between inflation, economic growth, and government expenditure, with short-term effects on economic growth.Magazzino, (2021) examines the relationship between public expenditure and inflation in Mediterranean countries

from 1970-2009 using a time-series approach. It finds a long-run relationship between public expenditure growth and inflation only for Portugal, and short-run evidence of a directional flow from expenditure to inflation in Cyprus, Malta, Spain, Italy, and France.

Mehrara, Soufiani and Rezaei, (2016) explore the nonlinear relationship between inflation and government spending using quarterly data from 1990-2013. It suggests a two-regime model, with liquidity growth as a transition variable. The study reveals that tight money or low liquidity regimes do not cause inflation, while low liquidity growth stimulates economic growth. Monetary and fiscal policies can control inflation and decrease inflation. Also, Token, Mignon, Villavicencio (2021) used PSTR models to study inflation-growth relationships in 44 countries, finding a threshold of 19.6% for lower-middle and low-income countries and government spending being more effective.Trupkin, (2021) used a PSTR model to analyze inflation-growth dynamics in 120 countries from 1950-2007. Results showed a 19.1% threshold for non-industrialized countries and a rapid transition from low to high inflation regimes.

Babalola and Oyeyemi,(2023) investigates the causal relationship between Nigeria's budget deficit and inflation rate using secondary data from the World Development Indicator and Central Bank of Nigeria. Results show a uni-directional causality, with inflation directly and indirectly affecting the budget deficit through fluctuations in the exchange rate and balance of trade in the Nigerian economy.

3.0 Methodology and Data

The Barro, (1974) model on fiscal deficits and Ricardian equivalence theory provide theoretical foundations for understanding the relationship between government expenditure and inflation, particularly in Nigeria.Recent studies such as Korkmaz and Güvenoğlu, (2021) and Campbell, Oluwatosin and Ojo, (2022)show that nonlinear specification can improve univariate models and economic variables often undergo regime switches. Smooth Transition Regression (STR) models have been developed to handle this smooth transition.The smooth transition regression (STR) model is a nonlinear regression model that is a significant advancement of the switching regression model (Terasvirta, 2004). The model considers transition as a continuous process, incorporating regime switching behavior in uncertain times and short periods, providing additional information on variables' dynamics.

Following the modification of the work of Mehrara, Soufiani and Rezaei, (2016), a standard STR model with transition logistic function is specified as follows

$$INF_t = \emptyset' z_t + (\theta' z_t) EXP_t(s_t, y, c) + \varepsilon_t \quad 1$$

Then, the description and definition of variables and parameters used in this paper are shown in the Table 1 below

Table 1: Definition of variables and parameters

Variables and Parameters	Definition
INF_t	Inflation rate
EXP_t	Government expenditure growth
$\emptyset' z_t$	Vector of linear coefficient
$\theta' z_t$	Vector of nonlinear coefficient
s_t	Transition variable
c	Threshold value
ε_t	Stochastic error term

Monthly data from 2000m1 to 2023m6 sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin (2023) are used while the variables used are inflation rate and government expenditure as a percentage of GDP.

4.0 Results and Discussion

Unit Root Test

The KPSS unit root test, proposed by Kwiatkowski-Phillips-Schmidt-Shin (1992), was used to determine the stationarity or otherwise of the variables used in this analysis and the null hypothesis is that the variable is stationary. The results of the unit root test are presented in Table 2.

Table 2: KPSS Unit Root Test results

Variable	LM-Stat	Asymptotic critical values
INF	0.3726	0.3470*
EXP	1.1875	0.7390***

Notes: ***, **, and * indicate significance at the 1, 5 and 10 % levels, respectively
Source: Author's computation

The rule of thumb is that KPSS depends on Langrange Multiplier (LM) principle. The results show that LM statistic of INF (0.3726) is greater than the asymptotic critical value (0.3470) at 10% level of significance, then the null hypothesis is accepted and the variable is stationary at levels. Also, it was revealed that LM statistic of each EXP (1.1875) appears to be greater than the asymptotic critical value of 0.7390 at 1% level of significance, then the null hypothesis is equally accepted and the variables are stationary levels.

Findings

The study used Smooth Transition Regression with Single-regime logistic transfer function and parameters are estimated using the Newton-Raphson algorithm, considering linear and non-linear terms. It also considers both linear and non-linear variables with statistically significant coefficients at the appropriate confidence level. There are basically two regimes considered in this study and they are: high and low growth regimes of government expenditure.

Table 3:Smooth Transition Regression (STR) Results

Method: Smooth Transition Regression (STR) Model **Dependent Variable:INF_t**		
Variables and Parameters	**Linear Coefficient ($\emptyset'$)**	**Non-linear Coefficient (θ')**
EXP_t	0.0307**	0.0769**
EXP_{t-1}	-	-0.0157**
Transition variable (s_t)	-	0.0737***
Threshold value (c)	-	4.138***

HQ = 3.139	Adjusted R^2 = 3.9%	AIC = 3.111

Notes: ***, **, and * indicate significance at the 1, 5 and 10 % levels, respectively
Source: Author's computation

From the results in Table 3 above, the estimated decisive values for transition variable (s_t) and threshold value (c) are 0.0737 and 4.1% respectively. The implication of these results is that government expenditure (which is the transition variable in this regard) takes an approximate 7.37% rate to switch from either high to low growth regime in an attempt to combat inflation in Nigeria and the threshold for regime change is 4.1%. This practically in line with the conclusion of the work of Trupkin, (2021) which revealed a 19.1% non-industrialized threshold and a swift shift from low to high inflation regimes.

Also, the coefficients show short-term effects of government current expenditure on inflation in two regimes. In the first regime, 1% increase in government expenditure leads to 3.07% rise in inflation, while in the second regime, 1% increase in government expenditure leads to 7.69% rise in inflation.Again, the sum of the coefficients of current government expenditure and its lag is 0.0612. This equally indicates that 1% increase in government expenditure leads to 6.12% rise in inflation. By implication, increased government spending appears to be highly inflationary especially in a high growth regime where government expenditure is mostly financed by the central bank.The results of this study are partially in line with the findings of Dikeogu, (2018) which reveals that government capital spending negatively impacts inflation while recurrent spending has both positive and negative effects in Nigeria. This study findings are also partly in terms with the work of Token, Mignon, and Villavicencio, (2021) that monetary and fiscal policies can control and decrease inflation, with government spending being more effective in lower-middle and low-income countries. On the contrary, the results of this paper are against the

findings of Mehrara, Soufiani, and Rezaei, (2016)which suggest a two-regime model, indicating that tight money or low liquidity regimes do not cause inflation.

Diagnostic Tests

The linearity and encapsulated non-linearity tests using EXP(-1) as the threshold variable are shown in the Tables 4 and 5 below

Table 4: Smooth Threshold Linearity Test Results

Linearity Tests			
Null Hypothesis	**F-statistic**	**d.f.**	**p-value**
H04: b1=b2=b3=b4=0	5.269	(2, 240)	0.0058
H03: b1=b2=b3=0	5.269	(2, 240)	0.0058
H02: b1=b2=0	5.269	(2, 240)	0.0058
H01: b1=0	7.588	(1, 241)	0.0063
Terasvirta Sequential Tests			
Null Hypothesis	F-statistic	d.f.	p-value
H3: b3=0	2.891	(0, 240)	0.0004
H2: b2=0 | b3=0	2.891	(1, 240)	0.0004
H1: b1=0 | b2=b3=0	7.589	(1, 241)	0.0063

Source: Author's computation

Table 5: Smooth Threshold Remaining Nonlinearity Test Results

Encapsulated Nonlinearity Tests			
Null Hypothesis	**F-statistic**	**d.f.**	**p-value**
H04: b1=b2=b3=b4=0	10.61	(2, 237)	0.0000
H03: b1=b2=b3=0	10.61	(2, 237)	0.0000
H02: b1=b2=0	10.61	(2, 237)	0.0000
H01: b1=0	10.61	(2, 237)	0.0000
Terasvirta Sequential Tests			
Null Hypothesis	**F-statistic**	**d.f.**	**p-value**
H3: b3=0	10.61	(0, 237)	0.0000
H2: b2=0 | b3=0	10.61	(0, 237)	0.0000
H1: b1=0 | b2=b3=0	10.61	(2, 237)	0.0000

Source: Author's computation

All tests are based on the third-order Taylor expansion (b4=0) and the original model is rejected at the 1% level using H03 recommended model first-order logistic: $\Pr(\mathrm{H3}) <= Pr(H2)\ or\ Pr(H1) <= Pr(H2)$. In summary, from the results of diagnostic tests above, both linear and non-linear estimations passed all of the tests and are hereby considered satisfactory.

5.0 Conclusion

Recent research on Nigeria's economic landscape offers valuable insights into the causal relationship between government expenditure and inflation, addressing unique challenges and opportunities for policymakers and researchers. This paper examines the relationship between government spending and inflation in Nigeria using a Smooth Transition Regression model (STR). The study uses STR to investigate both the linear and nonlinear effects of the former on the latter from 2000: 1 to 2023:6.

The study shows that linear approximation cannot sufficiently explain non-linear effects of government spending on inflation in different regimes of high and low growth of government

expenditure. Increased government spending appears to be highly inflationary especially in a high growth regime where government expenditure is mostly financed by the central bank. In a low growth regime where government spending is not financed by the central bank, avenue should be given to fiscal policy to stimulate and control inflation. This approach reduces dependence on borrowing and is regarded as a disciplined monetary-fiscal policy tool that can effectively combat inflation.

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