The Effect of Fiscal Policy Shocks on Income Inequality and Household Poverty Reduction: Evidence from Nigeria

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Abstract

This study aims to investigate fiscal policy shocks' impact on Nigeria's Income Inequality and Household Poverty. Using the impulse response function and variance decomposition technique within the Bayesian Vector Autoregressive framework (BVAR), findings from the study show that from year 2 to 15, a 1% shock to tax revenue (i.e., when taxes are suddenly changed) generates a reduced average impact of 0.036% on household poverty. In contrast, household poverty increases with shocks to government expenditure (i.e., when government expenditures are suddenly altered) in the short run, with an average impact of 0.022%. In other words, household poverty increases in the short run (years 2 to 4) and decreases in the medium to long run (years 5 to 15) with shocks to government expenditure. Similarly, the results show that shocks to tax revenue reduce income inequality (years 2 to11), and it increases the gap between the rich and the poor in the long run (years 12 to 15). Meanwhile, shocks to government expenditure increase the gap between the rich and the poor in the short to medium run (year 2 to 6) while decreasing the gap in the medium to long run (year 7 to15). The implication of these findings suggests that shocks to tax revenue directly benefit low-income families and individuals in Nigeria. Moreover, as unanticipated alteration of government expenditure increases household poverty and income inequality in the short run to medium run, any shock to government expenditure (internal or external) should be combated with pro-poor policy action.

Keywords: Fiscal Policy; Fiscal Policy Shocks; Income Inequality; Household Poverty; Bayesian Vector Autoregressive Model (BVAR).

JEL Classification Codes: H30, E62, I32, I30, C51

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1. Introduction

Poverty and income inequality are prominent sustainable development goals (SDGs) that have gained global attention in the last 10 years (Adetunji-Babatunde *et al*., 2012; Aikins & Mclachlan, 2022). In Africa, approximately 460 million people live in poverty as of 2022, with a poverty rate of 43.1%, surpassing the global poverty rate of 42.8% (Aikins & Mclachlan, 2022). This is particularly a serious case in Nigeria (a country identified as one of the leading hubs of poverty in Africa) (Oyedeji, 2024). According to the Nigerian National Bureau of Statistics (NBS), 40 percent of the total population, or almost 83 million people, live below the country's poverty line of 137,430 Naira ($381.75) per year – indicating that at least 4 out of every 10 Individuals in Nigeria are poor (Kasuwa, 2024). At the same time, there is a considerable gap between the rich and the poor, with the Gini coefficient around 35.1 as of 2023 (Harmon, 2023).[1]

The fight against poverty and income inequality has taken centre stage in policy approaches, and the reason for this is not far-fetched. By 2020, the increasing poverty rate and the gap between the rich and the poor had worsened globally, especially during the COVID-19 pandemic, which threw world economies into different crises (Aikins & Mclachlan, 2022). Policy approaches to alleviate these economic phenomena have been an unending search, especially in developing nations like Nigeria. Thus, there is an ongoing debate about the structure of poverty and inequality-reducing policies, as no consensus has been reached yet (Usman and Idoko, 2021).

Furthermore, the argument that fiscal policy measures, as alternative policy options, could help in the fight against poverty and income inequality has been the subject of discussion among scholars and policymakers and remains a contentious issue within the literature. Several studies have examined the impact of fiscal policy on poverty and inequality, with mixed conclusions. Studies that have examined fiscal policies and inequality/poverty in Nigeria have focused only on either fiscal policy and poverty (e.g., Usman and Idoko, 2021; Joy *et al*., 2021; Ibrahim and Umar, 2021; Omodero, 2019), or fiscal policy and income distribution/inequality (e.g., Obaretin *et al*., 2017; Anyaduba and Otulugbu, 2019; and Selem-Amachree and Ezekwe, 2021). These studies have also shown mixed findings. For instance, Usman and Idoko (2021), Opasina *et al*. (2016), Joy *et al*. (2021), Selem-Amachree and Ezekwe (2021), and Ibrahim and Umar (2021) found that fiscal policy, including government policies and taxation, has a reducing effect on poverty levels. However, Asaju *et al*. (2014) and Omodero (2019) found that fiscal policy has no significant impact on poverty reduction.

Notwithstanding, findings from previous studies have indicated that fiscal policies, direct taxes, and government expenditures have serious implications for poverty and inequality (Ojo, 2020; Obaretin *et al*., 2017; Anyaduba and Otulugbu, 2019; Joy *et al*., 2021; Enami *et al*., 2019). However, various scenarios, such as fiscal shocks[2], can hinder fiscal policy from achieving its economic growth and development objectives (Franko, 2021). Economies like Nigeria are vulnerable to external shocks, such as oil price fluctuations, economic downturns, and environmental shifts, which lead to sudden changes in government-proposed expenditure and/or anticipated revenue. For instance, events like the global financial crisis of 2007/2008 and the recent COVID-19 pandemic-induced oil price crash have significantly impacted Nigeria's fiscal policies, resulting in recessions and unanticipated budget adjustments with reduced spending on vital economic sectors (Benjamin *et al*., 2021) and increased government debt in some cases.

Moreover, it is interesting to note that the issues of policy shocks raised above have not generated many empirical investigations in Nigeria, pointing to a dearth of literature. Very little or nothing

[1] The value for the GINI index (World Bank estimate for wealth/income distribution) in Nigeria is 35.10 as of 2024, which ranks Nigeria as the 11th most wealth unequal nation in West Africa and 100th out of 163 countries globally.
[2] Shocks could both internal and external. Internal when it is a deliberate action by the government (endogenous). For example, in this study, these shocks can be an unexpected or unanticipated reduction in the tax rates or government expenditure. Then external or exogenous include global financial crisis, pandemic etc.

is known in the empirical literature on how fiscal policy shocks impact poverty and income inequality and the policy implications for fiscal policy options. Specifically, in the last few years, only a few studies have attempted to explore fiscal policy shocks. For example, Mirdala and Kameník (2017), Aye and Gupta (2019), and Furceri *et al*. (2022) have examined fiscal shocks and how they impact inequality, output, and a few other macroeconomic variables. There is no online footprint of studies that have considered shocks to fiscal policies and how they impact the poor and income distribution in Nigeria. However, some related studies exist, such as Akpan and Atan (2015), which examined Nigeria's macroeconomic and fiscal shocks, and Olomola and Oseni (2013), which explored fiscal shocks and consumption.

Based on the submission above, previous studies have neglected the importance of shocks in studying fiscal policy and its impact on poverty and inequality in Nigeria. This is important because several unanticipated factors could result in a sudden change in tax revenue and the availability of funds for expenditure, as experienced in the last decades in Nigeria, which has an important impact on the poor and the gap between the rich and the poor. The inability to predict and anticipate the impact of these shocks makes it difficult for the government to respond accurately, with ripple effects on social welfare. The mixed effect of the government's fiscal policy actions during an economic crisis raises many questions about whether these policies fairly affect the rich and the poor and what the short- and long-run effects on income distribution will be while facilitating sustainable development goals. Thus, this study is vital because it attempts to suggest evidence-based fiscal policy options for Nigeria's government to adopt in the case of sudden alteration of fiscal policies and unexpected economic setbacks, such as economic shocks, as seen in the past two decades. This study is crucial as it offers fiscal strategies to ensure that the goal of reducing poverty and narrowing income inequality remains intact, even in the face of unforeseen changes in fiscal policies, especially in government spending and taxation.

Therefore, unlike past research in this area, this study aims to examine the effect of shocks to fiscal policy on income inequality and household poverty in developing countries using Nigeria as a case study. The study employed the Bayesian Vector Autoregressive framework (BVAR), which gives a robust result, away from the standard Vector Autoregressive (VAR) framework. Moreover, to the best of our knowledge, there is no online footprint of studies that have considered shocks to fiscal policies and how they impact Nigeria's household poverty and income distribution.

The remaining part of this study is divided into four sections. We review of the literature in section two. Section three presents the methodology and data employed in the study. Sections four and five present the empirical results/discussion, and conclusion.

2. Review of Previous Literature

Some of the interesting findings in the literature review are highlighted in a few words in this section. Firstly, several authors have explored compelling theoretical perspectives that offer distinctive viewpoints on this multiplex nexus. One of the most influential theories used is the fiscal incidence theory, which provides a lens for understanding and measuring tax and government expenditure incidence and their effectiveness in redistributing income equitably (Martinez-Vazquez, 2004). Other theories are the Keynesian and classical school fiscal policy theory. These theories serve as the theoretical foundation for this study.

Secondly, studies that have examined the relationship between fiscal policy shocks, income inequality, and poverty are relatively few (for instance, Furceri *et al*., 2022 on government expenditure shocks); however, we have had studies that have considered the impact of fiscal policy on income inequality or poverty (for example, Anyaduba and Otulugbu, 2019; Selem-Amachree and Ezekwe, 2021; Malla and Pathranarakul, 2022; Usman and Idoko, 2021; Joy *et al*., 2021; Ibrahim and Umar, 2021; Omodero, 2019). Some of these studies found mixed results.

Several other studies (e.g., Kim and Samarasekara, 2023; Ulu, 2018) have also disaggregated their studies by independently examining the impact of government spending and taxation, which are the two main components of fiscal policy, on income inequality. On whether taxation is an effective tool for reducing income inequality, studies such as Muduli *et al*. (2022), Nantob (2016), and Duncan & Sabirianova-Peter (2008) have done some work in that regard. Their findings also show mixed results.

Thirdly, regarding the impact of fiscal policy shocks on poverty and inequality in Nigeria, there seems to be no online footprint of studies that have taken a keen interest in this topic. However, studies have shown the effect of government expenditure and/or taxation on inequality and poverty. For example, Awe (2013) and Yahaya (2020) arrived at the same conclusion, stating that increased allocation of funds to education, health, and agriculture will significantly reduce poverty in Nigeria. Several other related studies on the impact of government expenditures on poverty also found similar conclusions (Dahmardeh & Tabar, 2013; Arham & Naue, 2015; Elia *et al*., 2020). Moreover, examining the linkage between fiscal policy and poverty reduction in Nigeria, Farayibi and Owuru (2016) found that capital and recurrent expenditures have not reduced poverty levels in Nigeria mainly because of loopholes in allocating resources and implementing capital projects.

Studies on the effect of fiscal policy on inequality and poverty have also gained interest among researchers and policy analysts in Nigeria, with mixed results and conclusions. For example, Ojo (2020) investigates the impact of macroeconomic policies on inequality and poverty in Nigeria, and their empirical evidence shows mixed results. Odusola (2017) claims that fiscal policies can positively impact poverty and inequality through direct taxes. Anyaduba and Otulugbu (2019) reinforced this in a similar study examining taxation's impact on income inequality. Their findings suggest that company income tax reduces inequality, while value-added tax, customs, and excise duty have insignificant effects on inequality (Anyaduba and Otulugbu, 2019). Contrarily, studies such as Obaretin *et al*. (2017) suggest that taxation is ineffective in reducing income inequality in Nigeria.

Four, various techniques of analysis, ranging from simple descriptive analysis to econometric analysis, have been employed in the literature on fiscal policy, inequality, and poverty in Nigeria, but some of them are inappropriately used. Studies have utilised the Ordinary Least Square method (Obaretin *et al*., 2017; Omodero, 2019; Ojo, 2020), correlation analysis (Odusola, 2017), Error Correction Model (Anyaduba and Otulugbu, 2019), Autoregressive Distributed Lag model (Selem-Amachree and Ezekwe, 2021; Usman and Idoko, 2021; Joy *et al*., 2021), and General Equilibrium model (Obi, 2007). One of the critical issues from a methodological point of view concerns the nature and consistency of the measures of inequality and poverty and the appropriateness of the analysis technique. For example, Obaretin *et al*. (2017) employed correlation analysis to establish causation between fiscal policies and inequalities. Bivariate analysis (correlation analysis) is inappropriate for impact analysis. In another study, Odusola (2017) used an incorrect estimation technique. For variables with mixed stationarity, the Autoregressive Distributed Lag model produces better estimates for time-series analysis than the ordinary least square estimator employed by the study.

The analysis techniques used in this study will differ from those mentioned above. To fill the gap in the literature, we will employ the Impulse Response and Variance Decomposition technique within the Bayesian Vector Autoregressive Regression (BVAR) framework, which possesses some advantages over the techniques in the autoregression frameworks.

3. Methodology and Data

3.1 Empirical Model Specification

Following Gemechu (2017), this study presents the simple implicit form of the model as:

$$HCE_t = f(GE_t, TR_t,) \quad (1)$$

$$GC_t = f(GE_t, TR_t,) \quad (2)$$

Econometrically, equation (1) and (2) is presented in the BVAR framework:

$$HCE_t = \varphi_k + \sum_{i=1}^{q_1} \beta_i \, GE_{t-i} + \sum_{j=1}^{q_1} \alpha_j \, TR_{t-j} + \sum_{k=1}^{q_1} \pi_k \, X_{t-k} + \varepsilon_t \quad (3)$$

$$GC_t = \varphi_k + \sum_{i=1}^{q_1} \beta_i \, GE_{t-i} + \sum_{j=1}^{q_1} \alpha_j \, TR_{t-j} + \sum_{k=1}^{q_1} \pi_k \, X_{t-k} + \varepsilon_t \quad (4)$$

To show how inequality and household poverty respond to the components of government expenditure equations (3) and (4) are further broken down into:[3]

$$HCE_t = \varphi_k + \sum_{i=1}^{q_1} \beta_i \, CAPEX_{t-i} + \sum_{i=1}^{q_1} \beta_i \, RECEX_{t-i} + \sum_{k=1}^{q_1} \pi_k \, X_{t-k} + \varepsilon_t \quad (5)$$

$$GC_t = \varphi_k + \sum_{i=1}^{q_1} \beta_i \, CAPEX_{t-i} + \sum_{i=1}^{q_1} \beta_i RECEX_{t-i} + \sum_{k=1}^{q_1} \pi_k \, X_{t-k} + \varepsilon_t \quad (6)$$

Where GE= government expenditure, TR= Tax revenue, GC= Gini Coefficient, CAPEX= Capital Expenditure, RECEX= Recurrent Expenditure, HCE=Household final consumption expenditure, ε_t =Error term. The models considered household poverty in terms of consumption capacity (HCE). The variables are transformed using logarithm. The control variables (X) are population growth and real gross domestic product (a measure of economic growth).

3.2 Scope and Data Collection

The study explored yearly time-series data ranging from 1985-2023 for the empirical investigation necessary to investigate fiscal policy shocks' effect on Nigeria's poverty and inequality. The scope is determined based on data availability and the necessity to capture current economic developments. These data are sourced from existing databases such as the Central Bank of Nigeria Statistical Bulletin and the World Bank Development Indicator (WDI). Variables such as real gross domestic product, population growth, government expenditure, government tax revenue, household final consumption expenditure, Gini coefficient, government capital expenditure, and government recurrent expenditure are all obtained from the mentioned sources.

[3] Please note that due to lack of sufficient data on direct and indirect tax, we decided to leave out the component of taxation and examine the component of government expenditure only.

4. Empirical Results and Discussion

4.1 Test of Stationarity of the Series

Table 2 reveals that using the Augmented Dickey-Fuller Test (ADF) and Phillip Perron Test (PP), the variables are mixed stationary. That is, some are stationary at level, while others are stationary after the first difference. This is signified in the last column of Table 2. Variables that are I(0) are integrated at order zero (level form), while variables that are I(1) are integrated at first difference. These findings indicate that the series are suitable for the study since they are either stationary at level or first difference. This shows the presence of mean reversion in the variables.

Table 1: Unit Root Test Results

PP Test					
	Unit Root Test at Level		Unit Root at First Difference		I(d)
Variables	Intercept	Intercept and Trend	Intercept	Intercept and Trend	
LCAPEX	-2.14	-1.8	-6.83***	-7.14***	I(1)
LGC	-1.31	-1.19	-2.87*	-2.82	I(1)
LGEX	-2.6	-1.36	-7.72***	-10.79***	I(1)
LHCE	0.05	-3.15	-8.33***	-8.13***	I(1)
LRECEX	-5.82***	-1.51	-8.13***	-12.07***	I(0)
LRGDP	-0.3	-1.58	-3.87***	-3.80***	I(1)
LTAXR	-6.26***	-1.3	-7.54***	-21.58***	I(0)
POPG	-1.16	-1.14	-4.00***	-4.18***	I(1)
ADF Test					
	Unit Root Test at Level		Unit Root at First Difference		I(d)
Variables	Intercept	Intercept and Trend	Intercept	Intercept and Trend	
LCAPEX	-1.93	-1.87	-6.88***	-7.13***	I(1)
LGC	-1.34	-2.12	-3.84***	-3.78***	I(1)
LGEX	-4.24	-3.07	-1.87	-10.45***	I(1)
LHCE	-0.39	-3.07	-7.10***	-6.99***	I(1)
LRECEX	-1.97	-1.82	-8.28***	-9.54***	I(1)
LRGDP	-0.61	-1.41	-3.95***	-3.90***	I(1)
LTAXR	-3.90***	-1.68	-7.53***	-5.98***	I(0)
POPG	-1.14	-1.07	-3.98***	-4.22***	I(1)

Source: Author's computation (2023); ***, **, * means that the coefficient is significant at 1%, 5%, and 10%, respectively. L=logarithm transformation

4.2 Test of Co-integration

Tables 2, 3, 4, and 5 show the results of the co-integration test for models 1, 2, 3, and 4, respectively. Using the trace statistics and Maximum Eigenvalue, the null hypothesis of the no-cointegrating equation is rejected at a 5% significance level for all the models. Thus, there is a convergence to the long-run equilibrium among the variables in these models.

Table 2: Johansen Cointegration test for Model 1

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.670932	93.19987	69.81889	0.0002
At most 1 *	0.447624	54.29771	47.85613	0.011
At most 2 *	0.366937	33.52431	29.79707	0.0178
At most 3 *	0.279695	17.52283	15.49471	0.0244
At most 4*	0.158502	6.039997	3.841466	0.014
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.670932	38.90216	33.87687	0.0115
At most 1	0.447624	20.7734	27.58434	0.2902
At most 2	0.366937	16.00148	21.13162	0.2248
At most 3	0.279695	11.48284	14.2646	0.1316
At most 4*	0.158502	6.039997	3.841466	0.014

Source: Author's computation using data from Eviews 12 output

Table 3: Johansen Cointegration test for Model 2

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.690818	115.2059	69.81889	0.0000
At most 1 *	0.654676	74.12201	47.85613	0.0000
At most 2 *	0.481353	36.90751	29.79707	0.0064
At most 3 *	0.207711	13.92887	15.49471	0.0849
At most 4*	0.152224	5.779866	3.841466	0.0162
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.690818	41.08384	33.87687	0.0058
At most 1	0.654676	37.21450	27.58434	0.0021
At most 2	0.481353	22.97864	21.13162	0.0272
At most 3	0.207711	8.149004	14.26460	0.3638
At most 4*	0.152224	5.779866	3.841466	0.0162

Source: Author's computation using data from Eviews 12 output

Table 4: Johansen Cointegration test for Model 3

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.690818	115.2059	69.81889	0.0000
At most 1 *	0.654676	74.12201	47.85613	0.0000
At most 2 *	0.481353	36.90751	29.79707	0.0064
At most 3 *	0.207711	13.92887	15.49471	0.0849
At most 4*	0.152224	5.779866	3.841466	0.0162
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.690818	41.08384	33.87687	0.0058
At most 1	0.654676	37.2145	27.58434	0.0021
At most 2	0.481353	22.97864	21.13162	0.0272
At most 3	0.207711	8.149004	14.2646	0.3638
At most 4*	0.152224	5.779866	3.841466	0.0162

Source: Author's computation using data from Eviews 12 output

Table 5: Johansen Cointegration test for Model 4

Unrestricted Co-integration Rank Test (Trace)				
HypothesiSed No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.649137	83.56164	69.81889	0.0027
At most 1	0.495851	46.90402	47.85613	0.0613
At most 2	0.267574	22.93307	29.79707	0.2494
At most 3	0.226574	12.03431	15.49471	0.1553
At most 4	0.083243	3.041951	3.841466	0.0811
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
HypothesiSed No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.649137	36.65762	33.87687	0.0227
At most 1	0.495851	23.97095	27.58434	0.1357
At most 2	0.267574	10.89876	21.13162	0.6574
At most 3	0.226574	8.992364	14.26460	0.2868
At most 4	0.083243	3.041951	3.841466	0.0811

Source: Author's computation using data from Eviews 12 output

4.3 Test of Stability of the BVAR model

Ascertaining the stationarity and long-run co-integration of the models does not imply that the models are valid. Those pre-tests are essential but do not ensure the relevance and validity of the estimation. The model needs to be stable for the results to be valid and relevant. The condition of the model stability is to be sure the reciprocal of the modulus of all the roots is in the unit circle. Assuming that the reciprocal of four roots is bound outside the unit circle, the model, in that case, may not be stable, and the model's impulse response and variance decomposition analysis may be ineffective. The models' unit root diagram is shown in Figure 1.

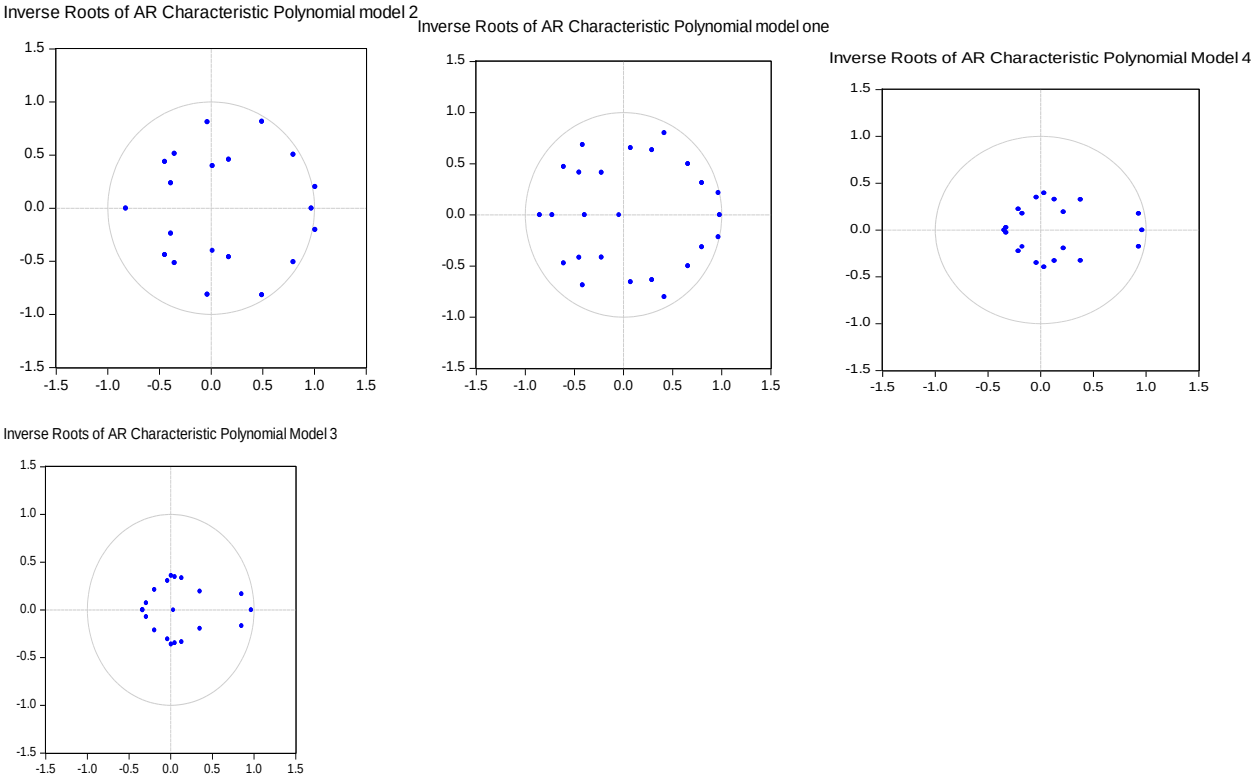


Figure 1: AR Root Diagram of the BVAR estimates

Figure 1 shows that the inverse root of AR characteristics is all within the unit circle for all the models. This indicates that the overall models consisting of the endogenous variables are effective and stable; that is, the existing relationships, as shown by the BVAR estimates, are valid.

4.4 Diagnostic Test

This study further investigates the results of the BVAR models by conducting more diagnostic tests besides the stability test to examine the validity of the BVAR results. This test includes a serial correlation test and a normality test. Table 6 presents the results of the test for the different models. The BVAR residual serial correlation LM test and the normality test shows that with the probability value of the Jarque-Bera statistics greater than 0.1, the residuals of the BVAR models are normally distributed at a 10% significance level. Likewise, the LRE* stat and the Rao F-stat, which present the residual serial correlation test statistics, show that the models are free from serial correlation since the probability values associated with the statistics are greater than 0.1 only for models one and two. Therefore, the focus is less on models 3 and 4 because the post-estimation shows serial correlation in the residuals, which means the results from these models (3 and 4) are invalid.

Table 6: Diagnostic Test

Model	Serial Correlation Test				Normality Test	
	LRE* stat	Prob.	Rao F-stat	Prob.	Jarque-Bera	Prob.
1	25.00665	0.4620	1.004598	0.4769	5.003438	0.8909
2	30.17845	0.2177	1.259422	0.3423	4.051965	0.9450
3	71.05651	0.0001	9.089054	0.0001	8.907517	0.1128
4	67.96055	0.0000	7.934434	0.0002	13.26375	0.2093

Source: Author's computation using results from the BVAR estimates

4.5 Empirical Results

Table 7: Impulse Response of Household Poverty to Fiscal Policy Shocks in Nigeria

	Model 1			
Period	TAXR	GEX	POPG	RGDP
1	0.000000	0.000000	0.000000	0.000000
4	0.051375	-0.009422	0.099246	0.072319
7	0.035034	0.082447	0.183311	0.115709
10	0.033911	0.152431	0.235723	0.129284
13	0.038059	0.210839	0.244713	0.118242
15	0.045376	0.237563	0.228081	0.102572

Source: Author's computation using data from BVAR estimates

Table 8: Variance Decomposition of Household Poverty to Fiscal Policy Shocks

Variance Decomposition of HCE: Model 1						
Period	S.E.	HCE	GEX	RGDP	TAXR	POPG
1	0.107665	100.0000	0.000000	0.000000	0.000000	0.000000
4	0.141940	62.51878	7.169459	8.718569	5.287737	16.30546
7	0.163914	49.69807	15.94405	8.999328	4.301080	21.05746
10	0.174198	46.66187	19.50309	8.234321	3.816044	21.78468
13	0.178598	45.24758	22.14542	7.992470	3.651506	20.96302
15	0.180563	44.41723	22.77220	8.197488	3.656075	20.95701

Source: Author's computation using data from BVAR estimates

Table 7 shows the accumulated response of HCE to fiscal policy shocks and its control variables. That is, the response of household poverty to a 1% shock to fiscal policy shocks through a 15-period (year) horizon. In the first period, immediately after the shock to tax revenue and government expenditure, household consumption expenditure, our measure of poverty, does not respond to these shocks with a response value of 0.00%, respectively. However, from period 2 to 15, a 1% shock to tax revenue generates a positive impact on household consumption expenditure. This means a 1% shock to government tax increases household consumption expenditure, indicating a reduction in poverty. The response value in period 2 is 0.023%, while it is 0.045% in period 15, while the impact coefficient over the 15 period, on average, is 0.036%. The implication of this finding suggests that shocks to taxation directly benefit low-income families and individuals in Nigeria. These findings are unique to this study but slightly align with the study by Adukonu and Ofori-Abebrese (2016), Enami, Lustig, and Taqdiri (2019) and Usman and Idoko (2021), who found that taxation can effectively reduce poverty. On the other hand, household consumption expenditure responds negatively to shocks in government expenditure from period 2 to period 4, with an average decrease of 0.022%. The impact response reverted to positive from period 5 to period 15, with steady growth in the impact coefficient and an average increase of 0.145%. This suggests that household poverty increases in the short run (years 2 to 4) and decreases in the medium to long run (years 5 to 15), following shocks to government expenditure. These findings are unique to this study.

The results of the variance decomposition of the household consumption expenditure to shocks to the fiscal policy are presented in Table 8. Decomposing the variation in household consumption expenditure between shocks to tax and government expenditure shows that household consumption expenditure responds to 100% variation in shocks to itself in the first year. Moreover, shocks to government expenditure recorded more variation in household consumption expenditure than shocks to taxation from year 2 to year 15. For example, as of year

15, shocks to government expenditure account for 22.7%, while shocks to taxes account for 3.36%. This finding aligns with the theoretical position that higher government spending significantly impacts the income level more than a reduction in taxation in the fiscal policy expansion policy option. This is because of the higher multiplier effect a change in government expenditure has on the economy.

Table 9: Impulse Response of Income Inequality to fiscal policy shocks in Nigeria

			Model 2	
Period	TAXR	GEX	POPG	RGDP
1	0.000000	0.000000	0.000000	0.000000
4	-0.019219	0.024405	-0.028810	0.020968
7	-0.019496	-0.016448	-0.080390	0.047630
10	-0.006954	-0.110239	-0.109601	0.052433
13	0.010683	-0.190843	-0.113338	0.064032
15	0.022153	-0.217567	-0.099159	0.068678

Source: Author's computation using data from BVAR estimates

Table 9 attempts to examine how fiscal policy shocks affect income inequality and reverberate through time. Table 9 reveals that 1% shocks in fiscal policy (tax revenue and government expenditure) have zero impact on income inequality in the first period. Subsequently, shocks to tax revenue generate a negative impact on the Gini coefficient between years 2 to 11, with an average impact of -0.013%. However, the direction of response changes from year 12, and the response of the Gini coefficient to shocks in taxation becomes positive, with an average increase of 0.013%. These findings suggest that shocks to tax revenue reduce income inequality in the short to medium run while increasing the gap between the rich and the poor in the long run. This aligns with the fiscal incidence theory and Lustig (2017), which suggests that the effectiveness of fiscal policy is determined primarily by the government's intentionality in executing pro-poor transfers and the extent to which it targets the rich through taxes.

On the other hand, shocks to government expenditure generate a positive impact on the Gini coefficient from year 2 to the sixth year. The average coefficient within this period is 0.016%. The subsequent period shows that the Gini coefficient decreases from year 7 to 15. This suggests that shocks to government expenditure increase the gap between the rich and the poor in the short to medium run while decreasing the gap in the medium to long run. This finding is unique and contrary to the findings of Kim and Samarasekara (2022), who believe that government expenditure as a fiscal tool worsens the inequality gap. This study, however, found that this is only in the short run. In the medium to long run, for effective and large reduction in income inequality, shocks to government expenditure is a viable tool for Nigeria.

Table 10: Variance Decomposition of Income Inequality to Fiscal Policy Shocks

Variance Decomposition of GC: **Model 2**

Period	S.E.	GC	TAXR	GEX	POPG	RGDP
1	0.028311	100.0000	0.000000	0.000000	0.000000	0.000000
4	0.057953	74.62225	4.243626	6.467711	10.14498	4.521436
7	0.076863	48.87238	2.943589	19.39501	22.12893	6.660088
10	0.096042	31.66028	2.483442	44.21952	17.27761	4.359137
13	0.108482	26.12430	2.876419	53.26835	13.93191	3.799021
15	0.112569	26.91308	3.200835	52.48165	13.78103	3.623395

Source: Author's computation using data from BVAR estimates

Table 10 show the decomposing of the variation in income inequality following shocks to tax revenue and government expenditure. Income inequality responds to 100% variation in shocks to itself in the first year. Moreover, shocks to government expenditure recorded more variation in income inequality than shocks to tax revenue from period 2 to period 15. As of period 15, shocks to government expenditure account for more than half (52%) of variation in income inequality, while shocks to taxation accounts for 3.2%.

4.6 Graphical Illustration of the Empirical Results

This study further presents a graphical illustration of the response to household consumption expenditure to shocks within the system. This is shown in Figure 2.

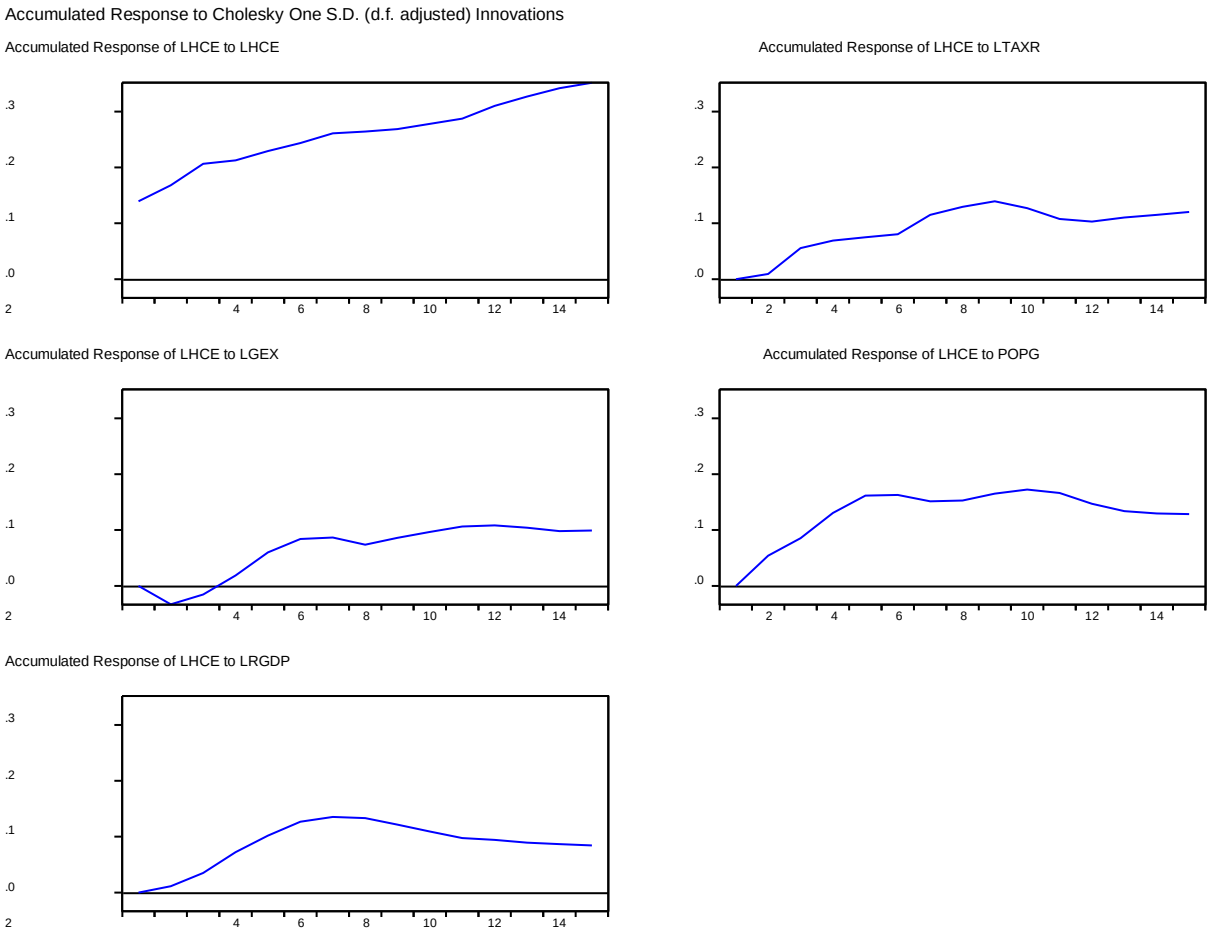
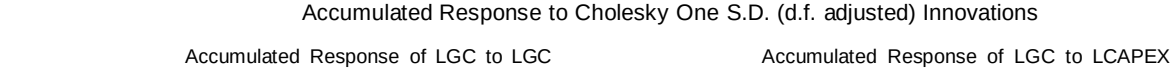


Figure 2: Impulse Response of Household Consumption Expenditure to Shocks to Fiscal Policy

Figure 2 shows that household consumption expenditure responds positively to shocks to household consumption expenditure, population growth, and the real gross domestic product over the periods, which corresponds with the results presented in the tables above. Household poverty decreases (responds positively) to shocks in real gross domestic product and population growth.



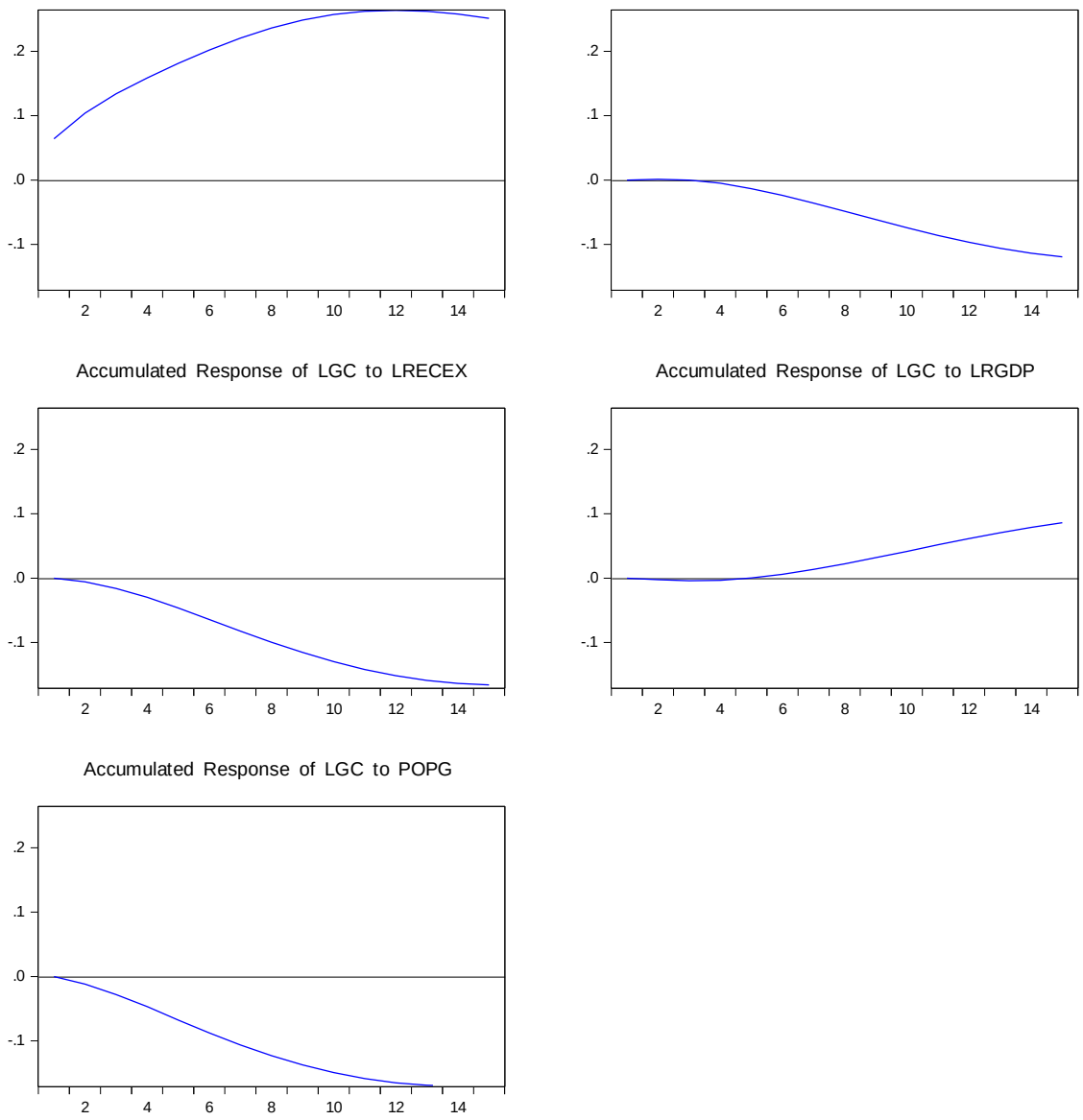


Figure 3: Impulse Response of Income Inequality to Shocks to Fiscal Policy.

Figure 3 shows that the Gini coefficient responds positively (increase in the gap between the rich and the poor) to shocks in real gross domestic product and Gini coefficient, while it responds negatively (reduce the gap between the rich and the poor) to shocks to population growth within the period.

5. Conclusion and Policy Implications

This study contributed to the literature by investigating the impact of shocks to fiscal policy on inequality and household poverty in Nigeria through the Bayesian Vector Autoregressive model to examine the responses of household consumption expenditure and Gini coefficient (measures of household poverty and income inequalities) to shocks in tax revenue and government expenditure. Findings from this study provide insight on the effectiveness of fiscal policy tools and available policy options for Nigeria in the advent of shocks within the economy, which could be internal (deliberate and unanticipated actions by the government) or external such as natural disaster and economic crisis, among others.

Findings from the study showed that endogenous shock (shocks within the system) to tax revenue is expected to reduce household poverty levels over time. In contrast, an endogenous shock to government expenditure initially increases household poverty level, then reduces household poverty level by raising household consumption after a while. On the other hand, endogenous shock to government expenditure widens the gap between the rich and the poor in

the short run but reduces this gap in the long run. On the contrary, endogenous shock to tax revenue reduces income inequality in the short run to the medium but increases income inequality in the long run.

The implication of this finding suggests that deliberate actions to suddenly alter taxation levels directly benefit low-income families and individuals in Nigeria. Meanwhile, as unanticipated alteration of government expenditure increases household poverty and income inequality in the short run, any shock to government expenditure (internal or external) should be combated with pro-poor policy action. This implies that the structure of the fiscal policy formulation can be such that in the advent of unanticipated changes in government expenditure either due to deliberate government actions, economic or financial crisis, or boom, low and middle-income families and individuals have a social safety net. This includes palliatives and social programs that shield them from any possible adverse effect of shocks, such as a reduction in income and consumption. As a result, in the advent of shocks to fiscal policy, the Nigerian government should consider a pro-poor fiscal policy. This will further achieve the objective of reducing household poverty and income inequality. Therefore, it is imperative for the policymakers in Nigeria to carefully consider the distributional impacts of tax reforms and sudden government expenditure alteration to minimise adverse effects on vulnerable populations.

Another implication of the results (the variance decomposition) from this study is that shocks to government expenditure could be more effective in causing household poverty and reducing income inequality. This suggests that as a poverty-alleviating fiscal policy tool, changes in government expenditure are more effective in reducing household poverty and income inequality than changes in taxation. This finding is unique to this study. This study has empirically shown that in the case of Nigeria, as a policy option, increasing government expenditure is more effective than reducing taxation in boosting the income level, reducing the poverty level, and reducing the gap between the rich and the poor.

Meanwhile, the shocks considered in this study are endogenous (shocks resulting from within the system). There are also exogenous shocks (shocks from outside the system) - such as international oil market shocks and international trade shocks - that can affect the household poverty level and income inequality. Although this is outside the scope of this study, the Nigerian government can prepare for exogenous shocks by being proactive and strategic to enhance resilience.

As a suggestion for further studies, this research work can be replicated for other countries and regions in a panel setting. Researchers can also disaggregate shocks (negative and positive shocks) to explore the asymmetric effect on household poverty and income inequality in Nigeria and elsewhere.

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