HOUSEHOLD WELFARE AND POVERTY IMPACT OF DOMESTIC REVENUE MOBILISATION STRATEGIES IN NIGERIA: A COMPUTABLE GENERAL EQUILIBRIUM (CGE) ANALYSIS

Ibrahim Umar Bambale[1*], Aliyu Sanusi Rafindadi[1], & Adamu Usman Bello[1]

[1]Department of Economics, Ahmadu Bello University, Zaria. Kaduna State

*Correspondence author's email: buibrahim.abu@gmail.com

Abstract

This study aims to simulate the household welfare and poverty impact of Nigeria's recent increase in the Value Added Tax (VAT) rate policy from 5 per cent to 7.5 per cent relative to an increase in either the Company Income Tax (CIT) rate or Personal Income Tax (PIT) rate. These increases in the tax rate policies were examined. This is done by linking a Standard Computable General Equilibrium (CGE) framework to Micro-simulation (MS) models. Within this framework, the choice of a Domestic Revenue Mobilisation (DRM) strategy is based on the criteria of maximum revenue generation with minimum welfare loss as well as a tolerable poverty state. Findings from this study rule out the public perception that an increase in the CIT rate from 30 per cent to 35 per cent will result in more government revenue. Specifically, the study revealed that the choice of a DRM strategy in Nigeria involves a tradeoff between maximum revenue generation and minimum welfare loss as well as a tolerable poverty state.

Keywords: CGE model; Household welfare and Poverty; Tax reform; Nigeria
JEL Classifications: C68, D58, E62, H25

Article history-Received: March 12, 2022, Revised: May 28, 2022, Accepted: June 2, 2022.

Introduction

The Nigerian economy becomes more fragile as Coronavirus, 2019 (COVID-19) hit the economy hard through the international oil market amidst the alarming state of poverty in the country. In terms of the Human Development Index (HDI) ranking, Nigeria dropped from 158th in 2018 to 161th in 2020 out of 189 countries (UNDP, 2020). Contrary to the HDI ranking, Nigeria maintained its status for almost a decade in the Multidimensional Poverty Index (50%). However, within the same period, the number of people that are multidimensional poor increased from 86 million to 98 million (UNDP, 2019). However, the Gini index indicated improvement in the poverty index from 42.2 per cent in 2017 to 35 per cent in 2018 (NBS, 2020).

Like most countries, Nigeria imposed the lockdown measure to curtail the explosion of the pandemic. To cushion the poverty impact caused by the lockdown measure, the Federal Government of Nigeria launched the COVID-19 Cash Transfer Project alongside other social intervention programmes. The objective of the programme is to lift 2 million urban poor and vulnerable households out of poverty by setting aside N10 billion[1] (Premiumtime, 2021). The question that follows is how can such programmes be financed simultaneously, considering the limited fiscal space in the country brought about by the low oil revenue and huge financing requirement for the country's health care system to respond appropriately to the pandemic (Farayibi & Asongu, 2020). In addition, many countries including Nigeria experienced capital outflow during the pandemic (OECD, 2020). Therefore, a Domestic Revenue Mobilisation policy could be

[1] https://www.premiumtimesng.com/business/business-news/467708-fact-check-buhari's-claimon-lifting-10-5-million-people-out-of-poverty-misleading.html

the last resort. In this light, Nigeria increased its Value Added Tax (VAT) rate to 7.5 per cent since its tax to GDP ratio is as low as 6 per cent (Solomon & Fidelis, 2018). Thus, the prevalence of poverty is of grave concern. Though opting for DRM strategies becomes a core agenda in Nigeria as contained in the 2019 Finance Act Sani-Omolori and Ataba (2019), the chosen DRM strategy is complex and openly contested considering the current state of poverty in the country. This concern is further heightened by public opinion that an increase in the Company Income Tax rate could result in a higher government income with the least welfare loss as well as a tolerable poverty state. Studies that provide empirical evidence to support discussions related to the likely welfare and poverty impact of the increase in the VAT rate relative to either increase in the Company Income Tax (CIT) rate or Personal Income Tax rate in Nigeria remain a key challenge.

An increase in the VAT rate in Nigeria is found to be associated with welfare loss. Although this is evident in Aminu (2019), its relative desirability to increase either the CIP rate or PIT rate has not been established empirically.

In Nigeria, despite the notable study of Aminu (2019), the studies that compare the relative desirability of an increase in the tax rates policies in Nigeria within the context of maximum government incomes with minimum welfare loss, as well as a tolerable poverty state criterion, are scarce. Therefore, this strand of literature could be extended further. It is expected that these policies would result in different poverty and welfare implications for the household.

Thus, the central research question this paper seeks to address is: what DRM strategy would result in maximum government income with minimum welfare loss as well as a tolerable poverty state in Nigeria? To empirically answer this research question, a Computable General Equilibrium (CGE) Model is adopted based on its ability to provide economy-wide effects of different policy scenarios in disaggregated fashion within a consistent framework (Wang et al.). In addition, it is suitable for distributional analysis by allowing a CGE model to be linked with a microsimulation model (Cury et al., 2010).

Stylized Facts of the Nigerian Economy

It can be observed from Figure 1 that government revenue in Nigeria follows the same trajectory as real oil prices.

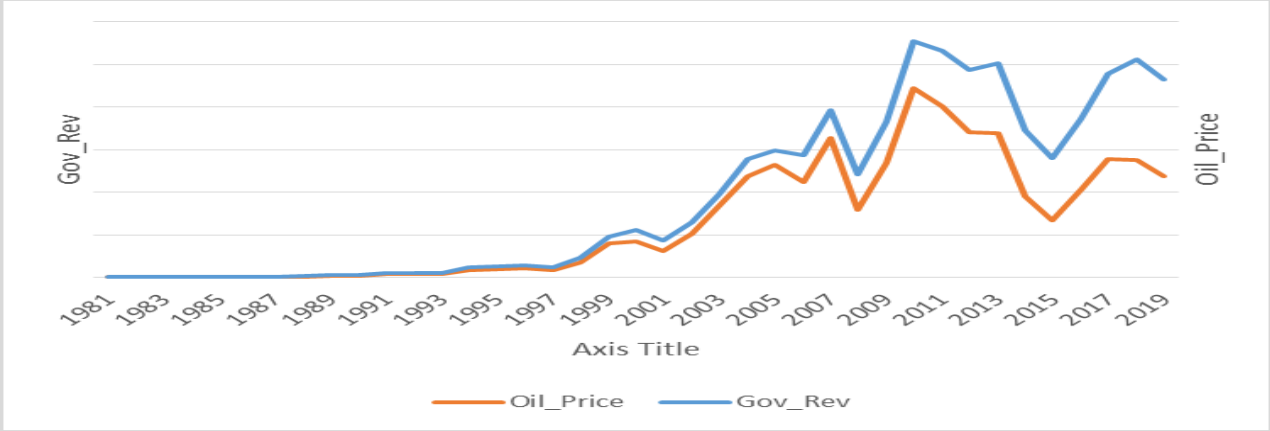

Figure 1 Oil Prices and Government Revenue in Nigeria, Sources: National Bureau of Statistics.

Nigeria experienced a downward trend in revenue from 1982 to 1885, following the oil crash of that period. Conversely, the country witnessed a sustained increase in government revenue from 1986 to 2008 as the price of oil continue to rise with minimal noise.

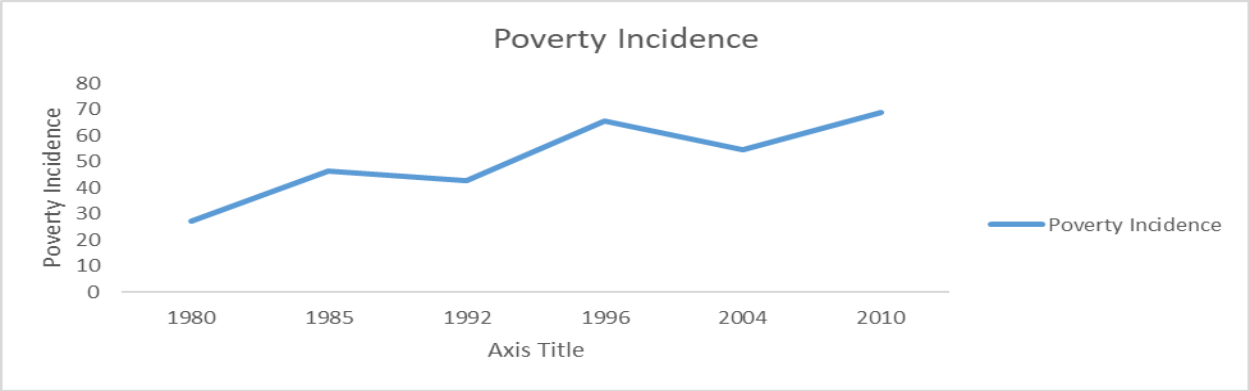

Figure 2 Population Living in Poverty in Nigeria, Sources: National Bureau of Statistics.

However, the change in the poverty incidence was negligible from 1986 to 1992 as observed in Figure 2. Even though, the poverty incidence in the county reduced to 54 per cent in 2004 and thereafter began to rise. The rise in poverty incidence could be attributed to the contagious effect of the 2008 Global Financial Crisis. Despite the official figure for poverty incidence beyond 2010 is not available for Nigeria, it is expected that poverty incidence could drop from its 2010 value owing to the oil boom of 2011 to 2013. Following 2014 to 2016 global dip in oil prices, government revenue in Nigeria witnessed a substantial downturn. However, oil prices begin to recover from 2017 to 2018 so does government revenue.

Overall, the poverty incidence in the country has been on a downward trend since 2010 despite 2014 to 2016 global dip in oil prices and the resulting 2016 recession. In 2019, the Nigerian Living Standard Survey reported 40.1 per cent poverty incidence in the country, out of which 51 per cent are in rural areas while 18 per cent are in the urban cities as presented in Table 1 (NBS, 2020).

Table 1 Poverty Indicators in Nigeria in 2019

	Poverty headcount rate, in the percentage of the population in strata
Nigeria	40.1
Urban	18
Rural	52.1

Sources: National Bureau of Statistics, 2020.

One possible explanation is the adoption of the consumption expenditure approach to measuring poverty incidence. Contrarily, the number of poor people in Nigeria is reported to have increased based on the Human Development Index (HDI) and Multidimensional Poverty Index (MPI) measurements.

The review of relevant literature is presented in the next section. Thereafter, a section related to the methodology used to achieve the set objective of this paper is followed. The section that follows relates to the presentation and discussion of results aimed at examining the welfare and poverty impact of DRM strategies in Nigeria. The conclusion and policy implications based on the findings eliminated from this study are reported in the last section.

Literature Review

Theoretical literature

Several theories offer different explanations regarding the impact of tax policy. According to Odhiambo and Olushola (2018), the Lindahl Model and Bowen Model are the most popular theories of taxation. The former explained taxation policy as a voluntary exchange between the citizens and the state, where the state provides public goods and services in return for the tax paid by the citizens. While the latter views the production of public goods as the opportunity cost of private goods. Finally, the allocation theory of taxation

is based on the second-best theory, which attributed the loss in welfare to a change in distortionary tax policy (Tresch, 2022). This study is anchored on the allocation theory of taxation based on its relevance in the distributional analysis of tax policy in a general equilibrium framework like the CGE model.

Empirical literature

A considerable amount of empirical work focuses on different aspects of tax policies. Taha *et al.* (2020) applied the pre, during and after reform approach to examine the welfare impact of the Malaysian increase in the VAT rate policy and found that following this policy general prices were not affected nor does consumer welfare. However, in the Democratic Republic of Congo, Adoho and Gansey (2019) found a contrasting result by applying the compensating variation measure of welfare. The result indicates that the purchasing power of all Congolese households decreases by a factor of 10 to 12 per cent following the introduction of VAT in the country. Gaarder (2019) assessed the welfare impact of the decrease in the food VAT rate in Norway by utilising a regression discontinuity design model. The study shows a decrease in inequality among the different household groups.

The computable general equilibrium model is utilised by Nguyen et al. (2017) to investigate the welfare impact of a decrease in the tax rate policy in Vietnam and found that tax rate cut leads to welfare improvement. Bhattarai et al. (2019) extend the study and applied the same methodology to compare the welfare implication of change in the VAT rate policy viz-a-viz change in the CIT rate policy and found that a combination of a 2 per cent increase in the VAT rate and a 3 per cent cut in the CIT rate is the most desirable policy.

Despite CGE models being rarely utilized in experimenting with the poverty impact of an increase in the tax rates policies, Damuri and Perdana (2003) applied such a model and simulated the poverty impact of the Indonesian increase in the income and sale tax rates policies. Findings from the study revealed that the increase in the income and sale tax rates policies result in a 13 per cent and 17 per cent increase respectively in the number of people living below the poverty line. Still in Indonesia, Resosudarmo et al. (2020) applied a CGE model to assess the relative effectiveness of different tax instruments in poverty alleviation. The study found that an indirect tax cut is the most effective instrument in alleviating poverty in Indonesia followed by the personal income tax rate cut. While corporate income tax rate cut appears to be the least effective instrument.

Few empirical studies linked microsimulation models to a CGE model in simulating the welfare and poverty impact of an increase in tax rate policies. A notable study is Mengistu (2013), the study linked a CGE model with the Equivalent Variation model as well as the Foster Greer Thorbecke (FGT) model to simulate the welfare and poverty impact of the Ethiopian increase in the VAT rate policy. The study found that the policy leads to improvement in government income with a significant welfare loss as well as an unacceptable poverty state.

Empirical evidence from advanced economies suggests different policy options have different welfare and poverty implications. This strand of literature is also pursued in Nigeria by Aminu (2019), the study applied a CGE model and simulated how Nigeria can achieve a 15 per cent increase in the VAT rate with minimum welfare loss and found that the country can achieve it in four years.

It is evident from the strands of literature reviewed in this study, that there have been concerted efforts globally in measuring the welfare and poverty implications of a change in the tax rates policies. Even though, it's a pear that there is no consensus in the literature. In this direction, a notable study for Nigeria is Aminu (2019), which focused on the welfare implications of a different increase in VAT rates policies. This study builds on the former by comparing both the welfare loss as well as the poverty state of an increase in the VAT rate policy relative to an increase in either the CIT rate policy or PIT rate policy in Nigeria. Another point of departure from the former study is that the current study used the 2016 national values as

the Social Accounting Matrix (SAM) benchmark data. In resource base economy constraints by limited fiscal space, applying maximum revenue with minimum welfare loss as well as a tolerable poverty state criteria in choosing a DRM strategy is ideal.

Methodology

Social accounting matrix (SAM)

A 2016 Social Accounting Matrix (SAM) for Nigeria is constructed to serve as the benchmark data feed into the CGE model to generate the consumer price index and consumption expenditure values used in the microsimulation models. The construction of the SAM began by aggregating the 2011 Nigerian input-output table construed by Falokun (2012) into six activities consisting of the Agriculture, Oil, Manufacturing, Energy, Private Service, and Public Administration sectors. Thereafter, the generalised RAS method was utilised in updating the aggregated input-output table with the 2016 National accounting data sourced from CBN (2017). The construction of a highly aggregated SAM follows. At the final stage, the updated input-output table and Nigerian Living Standard Survey (NBS, 2020) served as the basis for disaggregating the SAM. The 2016 macro-SAM is presented in Table 2.

In the SAM, each cell records the flow of economic activity with incomes on the rows and expenditures on the columns (Nwafor et al., 2010). The constructed SAM has its limitations. One of which is the assumption that the production structure of the economy is as was in 2011. Another limitation is that data are sourced from different sources making income and expenditure unbalanced. However, the cross-entropy technique is utilised to balance the SAM

Table 2: 2016 Social Accounting Matrix for Nigeria

	Factors	Households	Government	ROW	Activities	Commodities	Export	YTAX	STAX	IMTAX	ACC	TOT
Factors					103760.7							103760.7
Households	82669.22		5073.214	2107.016								89849.45
Government	15344				875.7486			77.34499	452.4193	306.1501		17055.66
ROW		4.403031				12367.39					-17.5132	12354.28
Activities		78726.58	13289.86			107869					15498.71	215384.2
Commodities					110747.7		10247.26					120995
Export				10247.26								10247.26
YTAX		77.34499										77.34499
STAX						452.4193						452.4193
IMTAX						306.1501						306.1501
ACC	5747.478	11041.13	-1307.41									15481.2
TOT	103760.7	89849.45	17055.66	12354.28	215384.2	120995	10247.26	77.34499	452.4193	306.1501	15481.2	

Source: Authors' Computation, 2022.

The computable general equilibrium model (CGE)

The Standard CGE model developed by Lofgren et al (2002) is adopted for this study. It is a real sector model as only relative prices matter. The model consists of several non-linear equations describing the optimal behaviour of different agents, including some accounting identities. The central focus of this paper is the welfare and poverty impact of DRM strategies in Nigeria. Therefore, the model accounts for the different sources of government revenue.

We opted for the following closure rules to achieve a feasible solution for the model. For factor closure, we choose a fixed labour supply and allowed labour to be unemployed and mobile across activities. Similarly, we opted for a fixed supply of land and assumed that the land is fully employed and mobile across activities. Likewise, we followed the fixed capital option, which is employed and activity-specific. In terms of macro closure, we assumed that direct taxes are exogenous and allowed government savings to be flexible. So does the foreign saving, which we assumed to be exogenous while the exchange rate is flexible. For all non-government domestic agents, their propensity to save is assumed to be fixed while allowing the capital formation to be flexible. Finally, we choose the Domestic Price Index (DPI) to be the numeraire allowing the Consumer Price Index (CPI) to adjust so that the economy can be in equilibrium. Below are some of the key behavioural equations of the adopted model.

Households

The utility function of the representative household is described by Stone-Geary utility functions as presented in equation 1

$$Max_i U_h = \prod\nolimits_i \left(C_{h,i} - \gamma_{h,i}\right)^{\beta_{h,i}} \quad s.t \sum\nolimits_i P_i C_{h,i} = \left(1 - s_h\right)\left(1 - yt_h\right) Y_h \qquad 1$$

Where the consumer maximises her utility subject to her budget constraint. In the above maximisation problem, $C_{h,i}$ represent the consumption level for goods i while $\gamma_{h,i}$ represents the level of substitution for goods i, and finally $\beta_{h,i}$ is the marginal budget share of goods i. The household has a total income Y_h out of which he saves a portion $S_h\left(1 - y_{t,h}\right)Y_h$ and pays an income tax $y_{t,h}$. In the budget constraint equation, P_i is the price for goods i and S_h is the saving rate of the consumer.

The household problem is represented by a demand function as presented in equation 2, which is the solution for equation 1

$$C_{h,i} = \frac{\beta_{h,i}\left[\left(1 - S_h\right)\left(1 - y_{t,h}\right)Y_h - \sum\nolimits_j P_j \gamma_{h,j}\right] + \gamma_{h,i}}{P_i} \qquad 2$$

Firms

Producers maximise profit subject to their respective production technology, which follows a nested structure. At the top level, each sector follows a Leontief production function to produce output by combining a fixed share of value-added and intermediate goods. While at the bottom level, each sector follows a Constant Elasticity of Substitution (CES) technology to determine its value added by combining composite labour and capital.

$$X_i = \lambda_i \left(\sum\nolimits_f \alpha_{i,f} v_{i,f}^{-\rho_i}\right)^{-\frac{1}{\rho_i}} \qquad 3$$

From the above equation, X_i the output of the sector i, λ_i is the factor productivity level, α_i is the parameter for the factors v_f employed in the production of the good i.

Government

In the model, the government has no behavioural function but serves as an institution with income and spending activities. The government generates income through different forms of taxes. Among others: are

household taxes $TDHT_t$, business taxes $TDFT_t$, tax on domestic products and import $TPRCTS_t$ s, and other taxes on production $TPRODN_t$. Additional sources of revenue to the government include the remuneration of capital YGK_t and transfer from other agents $YGTR_t$. A negative tax represents a subsidy. The government spent its revenue on government transfers to other agents $TR_{agng,gvt,t}$ and government consumption G_t. Government savings $SG_t = YG_t - \sum_{agng} TR_{agng,gvt,t} - G_t$ is the difference between government income and expenditure. A positive value represents surplus otherwise deficit.

$$YG_i = \sum_h y_t DTHT_t + \sum_i a_t TDFT_t + \sum_f f_t TPRCTS_t + YGK_t + YGTR_t - \sum_{agng} TR_{agng,gvt,t} - G_t \qquad 4$$

The micro-simulation model

The consumer price index and household consumption expenditure values for the before and after a shock simulation generated by the CGE model are fed into a microsimulation model in the form of the FGT poverty index to measure the extent of poverty.

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z-y}{z}\right]^\alpha \qquad 5$$

$$:\alpha \geq 0, y \prec z, i = 1,2,...,q; \left[y1 \prec y2 \prec ... \prec yq \prec z \prec yq+1 \prec ... \leq yn\right]$$

In the above model, z is the poverty line, the group of individuals below the poverty line is presented by i, the value of consumption expenditure below the poverty line is represented by y_i, n representing the population size while the total number of poor is represented by q. The poverty aversion parameter is α.

We are well guided by the procedure followed by Savard (2003) and Mengistu (2013) in linking the CGE model with the microsimulation model. We extracted 3626 households from the 2019 NLSS based on their responses to the same set of questions regarding their consumption expenditure. Thereafter, based on the proportion of non-poor to poor households in the 2019 NLSS and the SAM, the household consumption expenditure data was sorted in descending order and the bottom 41 per cent is considered to be the poor household group. The cutoff point in the household consumption expenditure data is considered to be the poverty baseline of this study. It follows that the household consumption expenditure data must be transformed before the computation of the FGT index. The household consumption expenditure is adjusted for the after-simulation values of consumption expenditure before feeding it into the microsimulation model. Similarly, the poverty baseline value is also adjusted for inflation by utilising the CPI values after simulation and later fed into the microsimulation model.

It should be noted that the difference between the poverty results obtained from this study and that of the 2019 NLSS may be attributed to: (i) we only concentrate on households that responded to the same set of questions regarding their consumption expenditure and the poverty line used in the 2019 NLSS is adjusted to the nominal value of the country's CPI. Finally, in this study, we are constrained by our constructed SAM to arrange household expenditure in descending order and assumed that the bottom 41 per cent are the poor. Similarly, the before and after household consumption expenditure and the before and after composite price index obtained from the simulation experiment are utilised to measure household welfare loss based on the Equivalent Variation measure of welfare:

$$EV_h = 100 * \frac{\left[\sum_{td} ch_{td,h} \prod_{td} \left[\frac{PQ_{0,td}}{PQ_{1,td}} \right]^{kt\_ch} - \sum_{td} ch_{0,td,h} \right]}{\sum_{td} ch0, td, h} \quad 6$$

Where the household welfare loss is EV_h, the household consumption expenditure for the before and after simulation are represented by $ch_{td,h}$ and $ch_{o,td,h}$ respectively. While the composite prices for the before and after simulation are $PQ_{o,td,h}$ and $PQ_{1,td,h}$ respectively. The household consumption parameter is kt_ch_h, tradable goods and household indexes are represented by td and h respectively.

Description of policy simulations

To achieve the set objective of this study, the following policy scenarios are considered:

a) **Baseline scenario:** This is considered the reference scenario without any policy intervention.
a) **Scenario one:** The impact of the chosen DRM strategy on household welfare and poverty is captured through an increase in the VAT rate. A 50 per cent increase in the VAT rate is considered based on the recent increase in the VAT rate from 5 per cent to 7.5 per cent in 2020.
b) **Scenario two:** The impact of the alternative DRM strategy on household welfare and poverty is captured through an increase in the CIT rate. A 17 per cent increase in the CIT rate is considered based on what is obtainable in other African countries to make the CIT rate 35 per cent.
c) **Scenario three:** The impact of the alternative DRM strategy on household welfare and poverty is captured through an increase in the PIT rate. A 25 per cent increase in the PIT rate is considered based on what is obtainable in other African countries to make the PIT rate 30 per cent.

Analysis of Result

To examine household welfare following a policy change, the equivalent variation measured of welfare is utilised to measure the level of income that will ensure households maintained the same level of utility in the absence of any shock. The welfare gains or loss following each simulation is reported in Table 3. An increase in the VAT rate policy from 5 per cent to 7.5 per cent will cause both the poor and non-poor households to lose 0.989 per cent of their welfare respectively.

The implication of this is that an increase in the VAT rate policy in Nigeria leads to rising menu prices and welfare deterioration. This is evident from the current study and supported in the literature see Mengistu (2013). Similarly, an increase in the CIT rate policy from 30 per cent to 35 per cent will cause the poor household to lose 0.620 of its welfare. Moreover, an increase in the CIT rate policy from 30 per cent to 35 per cent will cause a slightly higher welfare loss of 0.855 per cent for the non-poor household. Like the increase in the VAT rate policy from 5 per cent to 7.5 per cent, the increase in PIT rate policy from 24 per cent to 30 per cent will cause a 0.604 per cent welfare loss to both the poor and non-poor households respectively.

Table 3 Welfare Impact of Different DRM Strategies

HOUSEHOLDS TYPES	SIM1	SIM2	SIM 3
POOR	-0.989	-0.620	-0.604
NON-POOR	-0.989	-0.855	-0.604

Source: Micro Simulation Result

Impacts on poverty

The result in Table 4 shows the headcount index. An increase in the VAT rate policy from 5 per cent to 7.5 per cent will cause a 30.59 per cent increase in household poverty incidence. This implies that an increase

in the VAT rate policy from 5 per cent to 7.5 per cent in Nigeria will take away household income substantially leading to a decrease in their well-being and making their poverty situation worse in the short run. Moreover, an increase in the CIT rate policy from 30 per cent to 35 per cent will not result in any change in household poverty incidence. This implies that the increase in the CIT rate policy is not inflationary in Nigeria. Similarly, household poverty incidence will not be affected by an increase in the PIT rate policy from 24 per cent to 30 per cent as presented in Table 4. Likewise, an increase in the PIT rate policy from 24 per cent to 30 per cent will not add to inflationary pressure in Nigeria.

Table 4 Effects of Simulation on Poverty Head Count Index

INDICATORS	BASE	SIM1	SIM2	SIM3
POVERTY LINE	10190.00	1334.90	10193.60	10206.30
FGT	0.41127	0.53707	0.41127	0.41127
% CHANGE		30.59	0.00	0.00

Source: Micro-simulation Result, 2022.

The results of the poverty gap are reported in Table 5. An increase in the VAT rate policy from 5 per cent to 7.5 per cent will cause a 39.26 per cent increase in the household poverty depth. This implies that an increase in the VAT rate policy from 5 per cent to 7.5 per cent will affect a household's purchasing power and limits their ability to afford average consumable goods to be outside the poverty circle. Contrarily, an increase in the PIT rate policy from 30 per cent to 35 per cent will cause a 0.07 per cent reduction in the household poverty gap. This implies that the majority of the households will not be affected by an increase in the CIT rate policy from 30 per cent to 35 per cent, as the majority of Nigerians are labour endowed households. As in the case of the increase in the VAT rate policy, an increase in the PIT rate policy from 24 per cent to 30 per cent will cause an insignificant increase in the household poverty depth by 0.09 per cent. This implies that an increase in the PIT rate policy in Nigeria will erode household disposable income and leads to a worse poverty depth

Table 5 Effects of Simulation on Poverty Gap

INDICATORS	BASE	SIM1	SIM2	SIM3
POVERTY LINE	10190.00	13552.70	10036.34	9959.27
FGT	0.17696	0.24643	0.17682	0.17711
% CHANGE		39.26	-0.07	0.09

Source: Micro-simulation Result, 2022.

In Table 6, the result of the poverty severity (squared poverty gap) index is reported. An increase in the VAT rate policy from 5 per cent to 7.5 per cent will cause a 46.02 per cent increase in the household poverty severity. This implies that an increase in the VAT rate policy will widen income inequality in Nigeria. Contrarily, in the case of an increase in the CIT rate policy from 30 per cent to 35 per cent, the household poverty severity will decrease by 0.18. This implies that an increase in the CIT rate policy may lead to an insignificant decrease in the household poverty severity in Nigeria. However, the household poverty severity will not be affected by an increase in the PIT rate policy from 24 per cent to 30 per cent. This implies that an increase in the PIT rate will not lead to worse poverty severity in Nigeria.

Table 6 Effects of Simulation on Poverty Severity Index

INDICATORS	BASE	SIM1	SIM2	SIM3
POVERTY LINE	10190.00	13552.70	10036.34	9959.27
FGT	0.10127	0.14789	0.1011	0.10128
% CHANGE		46.02	-0.18	0.00

Source: Microsimulation Result, 2022.

Choice of domestic revenue mobilisation strategy

It can be observed from the result in Table 7, that an increase in the VAT rate policy from 5 per cent to 7.5 per cent will result in the largest increase in government incomes and the highest welfare loss as well as worsen poverty state in the short run. Specifically, an increase in the VAT rate policy will be a more desirable policy in terms of revenue generation, as it will result in an 8.941 per cent increase in government income. Contrarily, the increase in the VAT rate policy will be the worse policy in terms of welfare loss and poverty state. This policy will cause households to lose 1.268 per cent of their welfare while poverty severity will be worse by 46.02 per cent.

Even though an increase in the CIT rate policy from 30 per cent to 35 per cent will be a desirable policy in terms of an increase in government revenue, it will result in a moderate increase of 4.059 per cent in government revenue. However, the increase in the CIT rate policy will be a more desirable policy in terms of tolerable welfare loss as well as improvement in poverty severity. Specifically, this policy will result in a 0.772 per cent welfare loss and a 0.18 per cent improvement in poverty severity. Moreover, an increase in the PIT rate policy from 24 per cent to 30 per cent will be the least desirable policy in terms of revenue generation, as it will result in only a 0.002 per cent increase in government revenue. It implies that an increase in the PIT rate policy in Nigeria defeated the core objective of DRM.

Table 7 Effects of Simulation on Domestic Revenue Mobilisation

Indicators	SIM1	SIM2	SIM3	Sources
Government Income	8.941	4.059	0.002	CGE Result
Equivalent Variation	-1.268	-0.772	-0.606	Micro Simulation
Change in Poverty Severity	46.02	-0.18	00	Micro Simulation

Source: Microsimulation Result, 2022.

Conclusion and Policy Implications

The COVID-19 pandemic results in huge capital outflow and makes public debt instruments unattractive, due to the high uncertainty in the global economy. DRM appears to be the surest source of public finance in a debt constraint economy with limited fiscal space. Even though the goal of the DRM policy is to generate maximum revenue through taxes, the government is concerned with the welfare and poverty impact of such policy. In this direction, the government opted for an increase in the VAT rate policy from 5 per cent to 7.5 per cent based on the argument that the tax to GDP ratio in Nigeria is only 6 per cent (Solomon & Fidelis, 2018). The result of DRM strategies generally shows welfare loss and the intensity of poverty in the short run.

In general, we found that the choice of DRM strategy in Nigeria involved a tradeoff. An increase in the VAT rate policy from 5 per cent to 7.5 per cent will result in the highest increase in government incomes at the cost of a higher welfare loss and a worse state of poverty in the short run. While an increase in the CIT rate policy from 30 per cent to 35 per cent will result in a moderate increase in government revenue at the cost of a tolerable welfare loss as well as a poverty state. However, an increase in the PIT rate policy from 24 per cent to 30 per cent appears to be the least desirable strategy considering the country's limited fiscal space.

From the foregoing, the policy implications emanate from this study showed that the choice of DRM strategy in Nigeria involves a trade-off. The choice of an increase in the VAT rate policy from 5 per cent to 7.5 per cent in Nigeria indicates that the Nigerian government placed more weight on revenue generation since fiscal stimulus policies can be developed to reduce the high welfare loss as well as the poverty state caused by the increase in the VAT rate policy.

References

Adoho, F., & Gansey, R. J. (2019). Welfare Impact of Value-Added Tax Reform: The Case of the Democratic Republic of Congo. *World Bank Policy Research Working Paper*(8923).

Aminu, A. (2019). A recursive dynamic computable general equilibrium analysis of value-added tax policy options for Nigeria. *Journal of Economic Structures*, *8*(1), 22.

Bhattarai, K., Nguyen, D. T. K., & Nguyen, C. V. (2019). Impacts of Direct and Indirect Tax Reforms in Vietnam: A CGE Analysis. *Economies*, *7*(2), 50.

CBN. (2017). *Annual Report 2016*.

Cury, S., Pedrozo, E., Coelho, A., & Callegari, I. (2010). *The Impacts of Income Transfer Programs on Income Distribution in Brazil: An Integrated Microsimulation and Computable General Equilibrium Analysis*.

Damuri, Y. R., & Perdana, A. A. (2003). The impact of fiscal policy on income distribution and poverty: a computable general equilibrium approach for Indonesia. *Economics Working Paper No. WPE068, Center for Strategic and International Studies, Jakarta, Indonesia*.

Falokun, G. O. (2012). *2011 Input-output Table for Nigeria*

Farayibi, A., & Asongu, S. (2020). The economic consequences of the COVID-19 pandemic in Nigeria. *European Xtramile Centre of African Studies, WP/20/042 (2020)*.

Gaarder, I. (2019). Incidence and distributional effects of value added taxes. *The Economic Journal*, *129*(618), 853-876.

Mengistu, D. A. (2013). The Impact of Fiscal Policy on Poverty in Ethiopia: A Computable General Equilibrium Microsimulation Analysis. *Ethiopian Journal of Economics*, *22*(1), 25-70.

NBS. (2020). 2019 poverty and inequality in Nigeria: Executive summary. *Issue May*.

Nguyen, M. t., Nguyen, T. H., & Le, T. t. v. (2017). Tax Reform, Sectoral Restructuring and Household Welfare in Vietnam. *International Journal of Economics & Management*, *11*(2). https://www.researchgate.net/profile/Huong-Nguyen-Thi-3/publication/322771445_Tax_reform_sectoral_restructuring_and_household_welfare_in_Vietnam/links/5bbde90d299bf1010175b81c/Tax-reform-sectoral-restructuring-and-household-welfare-in-Vietnam.pdf

Nwafor, M., Diao, X., & Alpuerto, V. (2010). A 2006 Social Accounting Matrix for Nigeria. Methodology and Results. Nigeria Strategy Support Program (NSSP), Report No. NSSP007. April 2010. *International Food Policy Research Institute*.

Odhiambo, O., & Olushola, O. (2018). Taxation and economic growth in a resource-rich country: The case of Nigeria. *Taxes and Taxation Trends*, 1990-2016.

OECD. (2020). COVID-19 and Africa: Socio-economic implications and policy responses. In: OECD Paris, France.

Premiumtime. (2021). Fact Check Buharis Claim on Lifting 10-5 Million People out of Poverty Misleading. https://www.premiumtimesng.com/business/business-news/467708-fact-check-buharis-claim-on-lifting-10-5-million-people-out-of-poverty-misleading.html

Resosudarmo, B. P., Yusuf, A. A., & Hartono, D. (2020). Spatial impacts of fiscal stimulus policies during the 2009 global financial crisis in Indonesia. *Asia-Pacific Journal of Regional Science*, 1-22.

Sani-Omolori, & Ataba, M. (2019). FINANCE ACT 2019: Official Gazette. https://ngfrepository.org.ng:8443/handle/123456789/958

Savard, L. (2003). Poverty and income distribution in a CGE-household micro-simulation model: Top-down/bottom-up approach. *CIRPEE Working Paper*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=485665

Solomon, B. A., & Fidelis, M. A. (2018). An appraisal of the Nigeria economic recovery and growth plan, 2017-2020. *African Research Review*, *12*(3), 25-37.

Tresch, R. W. (2022). *Public finance: A normative theory*. Academic Press.

UNDP. (2019). *More Nigerians are Multidimentionally Poor than a Decade before 2017* https://www.ng.undp.org/content/nigeria/en/home/presscenter/pressreleases/2019/new-data-challenges-traditional-notions-of-rich-and-poor-.html

UNDP. (2020). *The next frontier of Human development and the Anthropocene*.

Wang, L., Li, X., & Wang, W. *Fiscal Policy, Regional Disparity and Poverty in China: A General Equilibrium Approach*.