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Tax Policy Reforms and Income Redistribution in Nigeria: A Computable General Equilibrium Approach

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ABSTRACT: This study examines the redistributive effects of tax policy reforms on income inequality and poverty in Nigeria, a country facing persistent socio-economic disparities and fiscal challenges. Traditional approaches often fail to capture the complex interactions among tax instruments. To address this gap, the research applies a static Computable General Equilibrium (CGE) model calibrated to Nigeria's 2018 Social Accounting Matrix, enabling an integrated analysis of value-added tax (VAT), personal income tax (PIT), and company income tax (CIT) reforms. Three reform scenarios were simulated: increasing VAT from 7.5% to 15%, enhancing PIT progressivity through higher marginal rates for top earners, and reducing CIT from 30% to 20%, partially offset by PIT adjustments to ensure revenue neutrality. Results show that VAT increases exacerbate poverty and inequality, while progressive PIT reforms significantly reduce inequality and improve welfare for lower-income households. CIT reductions alone have limited redistributive impact, but when combined with PIT adjustments, they yield modest equity gains. The findings underscore the superior redistributive potential of progressive income taxation over consumption-based taxes. This research provides empirical evidence to guide equitable tax policy design in Nigeria and contributes to broader policy debates on fiscal equity and poverty reduction.

Keywords: Tax Policy Reforms, Income Redistribution, Computable General Equilibrium, Nigeria.

INTRODUCTION

Tax policy is a central instrument for promoting equitable income distribution and inclusive economic growth, especially in developing countries like Nigeria. However, Nigeria's tax system has long been hindered by an overdependence on oil revenues, narrow tax coverage, and administrative inefficiencies. These structural weaknesses have limited the system's capacity to reduce inequality and mobilise sustainable revenue. As Ariyo, (1997) observed, the productivity of Nigeria's tax system has historically been constrained by structural inefficiencies. While recent reforms—including the National Tax Policy of 2012 and Finance Acts from 2019 to 2022—aim to expand the tax base and promote equity, the actual redistributive effects of these efforts remain unclear. Recent analyses, such as PwC Nigeria, (2022), highlight key amendments under

the Finance Act 2022, aimed at broadening the tax base and improving equity through revised VAT, CIT, and PIT provisions.

Evaluating tax policy impacts in Nigeria is challenging due to the lack of robust, economy-wide analytical frameworks. Many previous studies rely on regression-based or descriptive approaches, which often assume partial equilibrium and fail to account for broader economic interactions. As a result, they offer limited insight into how tax changes ripple through production, consumption, and income distribution channels.

Computable General Equilibrium (CGE) models provide a more comprehensive alternative. These models capture the complex relationships among economic agents and sectors, enabling the simulation of policy impacts across the entire economy. Evidence from countries such as South Africa and Ghana highlights the usefulness of CGE models in analysing redistributive outcomes. Despite their advantages, CGE models are rarely used in Nigerian fiscal policy research.

This study addresses this gap by applying a CGE model specifically calibrated to the Nigerian economy. The model incorporates updated Social Accounting Matrix (SAM) data and reflects the country's structural features, including sectoral linkages, household diversity, and fiscal operations. It evaluates the distributional impacts of reforms in three key tax instruments: personal income tax (PIT), value-added tax (VAT), and corporate income tax (CIT). By simulating changes in these taxes—both individually and in combination—the study provides a nuanced understanding of how tax reforms affect poverty and inequality.

The analysis is grounded in Optimal Tax Theory and the principles of benefit and ability-to-pay. This reflects the foundational insight of Mirrlees, (1971), who argued that optimal tax systems should balance equity with efficiency by minimizing distortions while ensuring fairness in redistribution. These frameworks emphasise designing tax systems that minimize distortions while promoting fairness. In Nigeria, where indirect taxes dominate and inequality persists, assessing the equity-efficiency trade-offs of different tax policies is essential for guiding reform. Musgrave, (1959) remains a foundational reference in articulating the public finance principles guiding redistributive taxation.

Ultimately, this study contributes to both academic and policy debates. Empirically, it offers evidence-based insights for optimizing Nigeria's tax system. Methodologically, it demonstrates the value of CGE models in developing-country contexts where traditional tools fall short. The findings are intended to inform more inclusive and equitable fiscal policymaking. This aligns with the optimal taxation insights from Mirrlees (1971), who stressed minimizing efficiency loss while promoting fairness.

METHOD

This section elaborates on the methodological framework used in the study, detailing the structure and calibration of the Computable General Equilibrium (CGE) model, the population under analysis, data sources, analytical procedures and ethical considerations. It outlines the systematic steps followed to examine the redistributive effects of tax reforms in Nigeria.

Research Type

This study adopts a simulation-based quantitative research design. A Computable General Equilibrium (CGE) model is employed to analyse the economy-wide impacts of tax policy reforms on income distribution and poverty in Nigeria. The model facilitates the evaluation of both direct and indirect effects of fiscal interventions across production, consumption, and government sectors.

Population and Sample/Informants

The population of the study comprises the main economic agents represented in the Nigerian economy—households, firms, government institutions, and external sectors—as captured in the 2018 Social Accounting Matrix (SAM). Households are categorised into income quintiles to allow for distributional analysis. Since the study is based on a simulated model, no human informants were involved.

Research Location

The analysis is contextualised within the Federal Republic of Nigeria. The model incorporates national economic data, including fiscal policy variables, labour market dynamics and sectoral linkages. The choice of Nigeria is motivated by on-going tax reform initiatives and the need to understand their redistributive implications within an emerging economy. As Okafor, (2012) highlights, tax revenue plays a pivotal role in Nigeria's economic development, making the country a pertinent case for evaluating the redistributive impacts of fiscal reforms.

Instrumentation or Tools

The primary analytical tool is the PEP 1-1 single-country static CGE model, developed by (Decaluwé et al., 2009), and implemented using the General Algebraic Modeling System (GAMS). The model incorporates production technologies, household behaviour, government revenue and expenditure, trade flows, and factor markets, with functional forms based on Cobb-Douglas and Constant Elasticity of Substitution (CES) specifications. This modeling structure is consistent with the standards outlined by Hosoe et al., (2010), who provide a comprehensive framework for programming and simulating CGE models in applied policy analysis. The approach aligns with the CGE modeling structure proposed by Devárajan et al., (1997), who demonstrated the effectiveness of such models in analyzing fiscal policy in developing economies.

Data Collection Procedure

The study relies solely on secondary data. The core dataset is the 2018 Nigeria SAM, developed by the Nigerian Bureau of Statistics (NBS) in partnership with the International Food Policy Research Institute (IFPRI)(NBS, 2018). Additional macroeconomic data were obtained from the World Bank's World Development Indicators (WDI) and the International Monetary Fund

(IMF)(Bank, 2022a). Parameter values, such as elasticity, were adopted from existing empirical literature to ensure consistency and model robustness.

Data Analysis

Three tax policy reform scenarios were simulated and compared against a pre-reform baseline:

1. An increase in the VAT rate from 7.5% to 15%.
2. A more progressive PIT structure through higher marginal tax rates for top-income earners.
3. A reduction in CIT from 30% to 20%, with compensatory PIT adjustments to maintain revenue neutrality.

Each scenario's effects were assessed using indicators such as the *Gini* coefficient (for inequality), poverty headcount ratio, real income variation across income quintiles, and the *Kakwani* progressivity index to evaluate the direction and magnitude of redistributive impacts(Kakwani, n.d.).

Ethical Approval

No primary data collection or human participants were involved in this study. All data were obtained from publicly available and reputable secondary sources. Consequently, no ethical approval was required, and the study complies fully with ethical research standards and data usage protocols.

RESULT AND DISCUSSION

This section presents the simulation results of the three tax policy reform scenarios and discusses their implications for income redistribution in Nigeria. Each subsection focuses on a specific policy scenario, with tables appropriately placed and explained according to APA 7th guidelines.

Baseline Scenario: Pre-Reform Conditions

Before any policy reforms are introduced, the model simulates the Nigerian economy under existing tax structures. The baseline Gini coefficient is estimated at 0.431, indicating a high level of income inequality consistent with national estimates (Bank, 2022b). This serves as the reference point for all subsequent policy simulations.

Scenario 1: Increase in VAT Rate

Increase in the VAT rate from 7.5% to 15% results in a regressive effect, poorer households that spend a higher proportion of their income on consumption, experience larger declines in real income. The Gini coefficient increases to 0.439, reflecting heightened inequality. Additionally, the poverty headcount rises across all quintiles, most severely among the bottom 40%.

Table 1. Impact of VAT Increase on Income Distribution and Poverty

Income Quintile	Change in Real Income (%)	Change in Poverty Headcount (%)
Q1 (Poorest)	-5.2	+3.1
Q2	-3.8	+2.4
Q3	-2.7	+1.5
Q4	-1.4	+0.9
Q5 (Richest)	-0.6	+0.2

Note. Data derived from CGE model simulations. Q1–Q5 represents ascending household income quintiles.

These results confirm that increasing VAT burdens low-income groups disproportionately. The policy's negative redistributive outcome aligns with existing literature on the regressive nature of indirect taxes (Keen, 2008). However Jenkins et al., (2006) argue that the progressivity of VAT can vary depending on country-specific exemptions and the structure of consumption patterns.

Scenario 2: Enhanced Progressivity in Personal Income Tax (PIT)
Under this scenario, marginal tax rates are increased for high-income households. The simulation shows real income gains for the bottom four quintiles and only a modest loss for the top quintile. Poverty declines slightly across lower-income groups, while the Gini coefficient falls to **0.419**, indicating an improvement in income equality.

Table 2. Impact of Progressive PIT Reform on Income Distribution and Poverty

Income Quintile	Change in Real Income (%)	Change in Poverty Headcount (%)
Q1 (Poorest)	+0.5	-0.3
Q2	+0.7	-0.5
Q3	+0.9	-0.6
Q4	+0.8	-0.4
Q5 (Richest)	-2.3	+0.1

Note. Simulation reflects an increase in top PIT rates, keeping other fiscal parameters constant.

This result supports the principle of vertical equity. Enhancing PIT progressivity redistributes income effectively while minimising adverse welfare impacts, especially for low- and middle-income households.

Scenario 3: Reduction in Corporate Income Tax (CIT) with PIT Adjustment
This scenario simulates a reduction in the CIT rate from 30% to 20%, compensated by a slight increase in PIT for higher-income earners to preserve revenue neutrality. The results show marginal improvements in real income across all quintiles, with the richest group gaining the most. Poverty declines are minimal, and the Gini coefficient shows a modest improvement to 0.428.

Table 3. Impact of CIT Reduction with PIT Adjustment on Income Distribution and Poverty

Income Quintile	Change in Real Income (%)	Change in Poverty Headcount (%)
Q1 (Poorest)	+0.1	-0.1
Q2	+0.2	-0.2
Q3	+0.4	-0.3
Q4	+0.5	-0.2
Q5 (Richest)	+0.7	-0.1

Note. Results based on revenue-neutral reform combining lower CIT and modest PIT increases for top earners.

Although the effects are positive, they are relatively small. This is partly because corporate tax cuts tend to stimulate investment and employment gradually, and the static CGE model used in this study does not capture these longer-term dynamics. Furthermore, benefits from lower CIT rates tend to accrue more to higher-income groups and firms, reducing the direct redistributive effect unless paired with strong progressive PIT measures. This observation is consistent with findings by Nallareddy et al., (2018), Rouen, and Serrato (2018), who documented that corporate tax cuts in the U.S. disproportionately benefited high-income earners and contributed to rising income inequality. From a policy perspective, the scenario suggests that corporate tax reforms can support modest welfare gains, but their equity outcomes depend on complementary adjustments in the personal income tax structure.

Comparative Overview of Reform Scenarios

Table 4 summarizes the comparative results across the three reform scenarios. Progressive PIT reform produces the most equitable outcomes, while the VAT increase is clearly regressive. The CIT reduction scenario yields modest but inclusive gains.

Table 4. Summary of Distributional Effects across Reform Scenarios

Scenario	Change in Gini Coefficient	Net Change in Poverty Headcount (%)
VAT Increase	+0.008	+2.3
Progressive PIT Reform	-0.012	-1.0
CIT Reduction with PIT Adj.	-0.003	-0.2

Note. Gini coefficients and poverty headcount changes are relative to the pre-reform baseline.

The discussion section interprets the findings of this study within the context of existing research, explores their practical implications, evaluates the strengths and limitations, and provides recommendations for future research.

Interpretation of Key Findings

The study highlights the critical role of tax policy design in influencing income distribution in Nigeria. Simulation results corroborate the regressive impact of consumption taxes and the redistributive potential of progressive income taxation. A key insight is the demonstrated

effectiveness of a more progressive Personal Income Tax (PIT) structure in reducing income inequality. This aligns with Lambert, (n.d.) framework on income redistribution, which emphasizes the balance between horizontal and vertical equity in tax system design.

Nonetheless, the findings emphasize that the extent to which these technical results translate into tangible redistributive outcomes depends heavily on Nigeria's institutional and administrative capacities. The model also shows that increasing VAT rates without compensatory social protection measures can deepen poverty and inequality. Lastly, the third policy scenario—reducing Corporate Income Tax (CIT) while adjusting PIT—yields limited but positive redistributive effects, suggesting the need for a carefully balanced reform mix.

Comparison with Previous Studies

The results of this study align with earlier empirical literature on tax incidence, which consistently identifies consumption taxes as regressive and income taxes—especially PIT—as more progressive instruments (Bird & Zolt, 2014; Lustig, 2018). Similar findings by Fuest, Peichl, and Schaefer (2018) in OECD countries reinforce the view that income taxation tends to yield more equitable outcomes than consumption-based taxation. The findings further support the argument advanced in prior research that the efficacy of redistributive tax policies is highly context-dependent, especially in developing economies with large informal sectors (Jellema et al., 2014). (Martinez-Vazquez et al., (2012)provide cross-country evidence that the structure and composition of tax and expenditure policies significantly influence income distribution outcomes. In terms of methodology, this study adds to the limited but growing body of literature applying Computable General Equilibrium (CGE) models in African fiscal policy analysis (Decaluwé et al., 2013), thereby enhancing the empirical understanding of tax reform implications within Nigeria's socio-economic context. Similarly, Younger et al., (2017) Osei-Assibey, and Oppong (2017) applied a fiscal incidence framework in Ghana and found that income-based taxes had a more progressive effect on redistribution than consumption taxes.

Limitations and Caution

While the CGE model employed offers significant analytical advantages, it remains a static model and therefore does not capture dynamic behavioural responses or long-term structural changes such as employment shifts, investment behavior, and capital accumulation. Mertens & Ravn, (2013) emphasize that dynamic tax models better capture behavioral responses and long-run effects of tax policy changes, which static models like the one used here may overlook. This limitation suggests that the short-term nature of the results may understate or misrepresent longer-term redistribution outcomes. This supports Jousten, (2007) argument that meaningful fiscal reform must also consider long-term structural adjustments, such as pension and social security reforms, to achieve sustained redistribution. Additionally, the simulations rely on several assumptions regarding tax compliance and administration, which may not fully reflect real-world complexities such as enforcement gaps, corruption, or political resistance. This is consistent with the argument of Coady & Harris, (n.d.), who emphasized the need to evaluate transfer programs within a general equilibrium framework to fully capture their distributional effects. Furthermore, the informal sector's size and limited data availability in Nigeria pose inherent constraints on the precision of tax incidence estimates.

Recommendations for Future Research

Future studies should explore the adoption of dynamic CGE models to better capture the long-term effects of tax reforms, including potential changes in labor supply, savings, and investment. Integrating simulations of public expenditure—particularly in health, education, and social protection—could also provide a more comprehensive view of fiscal policy impacts. Further research is warranted on the political economy dimensions of tax reform in Nigeria, particularly the role of elite resistance and institutional inertia. Lastly, empirical investigations into the effectiveness of compensatory social protection measures, such as targeted cash transfers, would enrich the evidence base for designing equitable and politically feasible tax policies. This model setup draws from the foundational work of Devárajan, Lewis, and Robinson (1997) on open-economy CGE models.

CONCLUSION

This study assessed the redistributive effects of tax policy reforms in Nigeria using a Computable General Equilibrium (CGE) model calibrated to national data. By simulating three scenarios—increased VAT, progressive PIT reform, and reduced CIT with PIT adjustments—the analysis revealed clear differences in distributional outcomes.

The results show that VAT increases have regressive consequences, intensifying poverty and inequality. In contrast, enhancing PIT progressivity emerges as the most effective approach for reducing inequality and supporting low- and middle-income households. The CIT reduction scenario yields modest and broadly shared welfare gains, but its redistributive effect remains limited unless paired with progressive income taxation.

These findings reinforce the importance of tax design in achieving social equity. However, they also highlight the constraints posed by Nigeria's institutional, administrative, and political realities. Addressing these structural challenges is essential for transforming fiscal policy into a more inclusive tool for national development. This aligns with Onyekwena & Bank, (2016), who emphasized that achieving inclusive growth in African economies requires integrating equity considerations into fiscal policy frameworks.

Policy Implications

To realise the equity-enhancing potential of tax reform, the following policy priorities are recommended:

1. Strengthen PIT administration and compliance - Expanding the tax net, particularly in the informal sector, and improving enforcement mechanisms are necessary to make progressive PIT effective in practice.
2. Approach VAT increases with caution - If VAT adjustments are pursued for revenue generation, they should be paired with targeted safety nets to protect vulnerable households.

3. Design CIT reforms with complementary policies - To ensure that CIT reductions contribute to both growth and equity, tax incentives must be accompanied by regulatory reforms, transparency, and corporate accountability. This aligns with the findings of Claus et al., (2012), who emphasized that the effectiveness of corporate tax reforms depends significantly on complementary measures such as corporate accountability and transparency. (Peralta & persele, (2006) caution that poorly coordinated tax competition—such as across sub-national jurisdictions—can undermine economic growth and exacerbate inequality, especially if not paired with broader regulatory safeguards.
4. Institutionalise distributional impact assessments - Regular ex-ante evaluations using CGE or similar tools should be part of the tax policy design process to ensure alignment with equity goals.
5. Invest in fiscal data systems - Strengthening national statistical capacity will improve policy simulation and evidence-based decision-making.

In conclusion, the study contributes to the fiscal policy debate by offering rigorous, evidence-based insights into how tax reforms shape income distribution in Nigeria. As the country continues to grapple with inequality and fiscal pressures, embedding equity at the core of tax policy is not only desirable—it is imperative for sustainable and inclusive development.

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