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The Effect of Taxation on Income Inequality in Zambia

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Abstract

This study examines the relationship between tax policy and income inequality in Zambia over the period from 1991 to 2024. Despite sustained economic growth driven by copper exports and expansion in construction and services, income inequality in Zambia has remained persistently high, with Gini index values ranging from 42.10 to 59.10 and a mean of 52.51, placing Zambia in the high-inequality category. Using annual time-series data from the Zambia Revenue Authority, Bank of Zambia, Zambia Statistics Agency, and World Bank publications, this study employs a semi-log multiple regression model to assess how three major tax instruments; Personal Income Tax (PIT), Company Income Tax (CIT), and Value Added Tax (VAT) associated with income inequality as measured by the Gini index. The empirical results reveal a mixed distributional effect of Zambia's tax policy. Personal Income Tax exhibits a negative and statistically significant association with the Gini index (coefficient: -6.893, $p < 0.01$), consistent with the ability-to-pay principle and progressive taxation theory, suggesting that a 10% increase in PIT is associated with approximately a 0.66 percentage-point reduction in inequality. Conversely, Value Added Tax shows a positive and statistically significant association (coefficient: 6.723, $p < 0.01$), indicating that VAT is regressive and exacerbates income inequality – a finding consistent with literature on consumption taxes in developing countries. Company Income Tax demonstrates no statistically significant effect, reflecting challenges related to tax incentives, profit-shifting, informality, and uncertainty regarding ultimate tax incidence. The findings imply that Zambia cannot rely on revenue mobilisation alone as evidence of tax progressivity; the composition of taxation matters critically for equity outcomes. Policy recommendations include strengthening PIT progressivity and compliance, improving CIT enforcement while limiting distortionary incentives, and pairing VAT revenue with targeted social spending to protect lower-income households from regressive consumption taxes. Limitations include the exclusion of Customs and Excise Duty, potential multicollinearity among tax variables, and the use of nominal collections rather than real per-capita measures. Future research should incorporate household-level fiscal incidence analysis and social expenditure variables to establish stronger causal evidence.

Keywords: Company Income Tax, fiscal redistribution, Gini index, income inequality, Personal Income Tax, Value Added Tax, Zambia

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1. Introduction

Income inequality is a significant challenge faced by many developing nations, including Zambia. As a landlocked country in Southern Africa, Zambia has undergone economic reforms over the years, with tax policies playing a crucial role in shaping the distribution of income. Despite the country recording economic growth in recent years, largely driven by copper exports, as well as strong expansion in construction and services industries, income inequality in Zambia has remained largely unchanged.

This study aimed to examine the relationship between tax policy and income inequality in Zambia. The research question that guided this study was: To what extent has Tax policy contributed to Income inequality in Zambia?

This study is important as it examined the effectiveness of Zambia's tax policies in addressing income inequality, proposing potential reforms for policymakers.

To answer the research question above, the GINI index was used as a measure of income inequality, the dependent variable.

The major types of taxes assessed in Zambia include Personal Income Tax, Company Income Tax, Value Added Tax, and Customs and Excise Duty. However, the statistical file available for the empirical analysis contained annual figures for Personal Income Tax, Company Income Tax, and Value Added Tax only. The regression analysis was therefore conducted using annual time-series data for the period 1991 to 2024, with Gini index as the dependent variable.

Based on the empirical findings, this study concludes that Zambia's tax policy has mixed distributional effects: Personal Income Tax appears to reduce income inequality, Value Added Tax appears to worsen income inequality, and Company Income Tax does not have a statistically clear effect over the period studied.

The remainder of the paper is organised as follows. Section 2 provides a brief review of the prior literature, while the methodology and dataset are described in Section 3. Empirical results are presented in Section 4, and Section 5 offers concluding remarks.

2. Literature Review

2.1 Income Inequality

According to the International Monetary Fund (IMF) inequality can be viewed from four different perspectives. These include inequality of outcome, which refers to interpersonal distribution of income, inequality of wealth, which encompasses distribution of wealth across individuals or households, life-time inequality, which covers the distribution of incomes or earnings for an individual over his or her lifetime, and inequality of opportunity, which refers to the relationship between income inequality and social mobility, being the mobility between income groups across generations .

Income inequality is defined by the OECD as a measure that highlights the gap between different individuals' or households' disposable income in a particular year and is the difference in how assets, wealth, or income are distributed among individuals and/or populations. It is also described as the gap between rich and poor, wealth disparity, wealth and income differences, or the wealth gap. Therefore, Income inequality refers to the extent to which income is distributed in an uneven manner among a population.

The Development Strategy and Policy Analysis Unit (2015) states that economic inequality has two aspects which include inequality of outcomes and inequality of opportunities. Inequality of outcomes takes an ex-post or achievement-oriented perspective, which refers to the material dimensions of well-being resulting from circumstances beyond one’s control, such as gender, ethnicity, family background, and so on. On the other hand, inequality of opportunities is an ex-ante or potential achievement perspective focusing on the circumstances beyond one’s control that affect one’s potential outcomes.

2.2 Measuring Income Inequality

Income is defined as household disposable income in a particular year. It consists of earnings, self-employment, capital income, and public cash transfers; income taxes and social security contributions paid by households are deducted. The income of the household is attributed to each of its members, with an adjustment to reflect differences in needs for households of different sizes.

The OECD (2023) recognizes five methodologies used to measure income inequality among individuals. These include the Gini coefficient which is based on the comparison of cumulative proportions of the population against cumulative proportions of income they receive; the S80/S20 ratio which is the ratio of the average income of the 20% richest to the 80% poorest; the P90/P10 ratio which is the ratio of the upper bound value of the ninth decile (that is, the 10% of people with highest income) to that of the first decile; the ratio P90/P50 of the upper bound value of the ninth decile to the median income and P50/P10 of median income to the upper bound value of the first decile and the Palma ratio which measures the share of all income received by the 10% people with highest disposable income divided by the share of all income received by the 40% people with the lowest disposable income.

However, the most commonly used measure of income inequality is the Gini coefficient or index, which was developed by the Italian statistician Corrado Gini (1912). The Gini coefficient is a method of measuring the statistical dispersion of income, consumption, and wealth, among other things. The coefficient for income inequality as measured by the Gini ranges from zero to 1.0, with zero representing total or perfect equality, implying that all persons have identical income, and 1.0 represents total or perfect inequality, implying one person has all of the income .

According to the World Bank Group (2024), the Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus, a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality . Bourguignon (2015) asserts that a Gini value of 0.55 and above is a high level of inequality, 0.45-0.55 is middle-high, 0.35-0.45 is middle, and 0.35 and below is a low level of inequality.

2.3 Taxation in Zambia

A tax system comprises of the tax policy, tax administration, and tax laws working together to attain the nation's economic goals (Abiola & Asiweh 2012). Taxes in Zambia are administered by the Zambia Revenue Authority (ZRA), which was established under an Act of Parliament of 1994. The authority's operations are supervised by the Ministry of Finance and National Development .

The main sources of tax law and regulations in Zambia, which facilitate taxation include the Income Tax Act that governs income tax in Zambia, The Value Added Tax (VAT) Act that governs VAT, the Customs and Excise Act that governs customs and excise duties, the Property Transfer Tax Act that governs property transfer tax, and the Mines and Minerals Development Act that governs mineral royalty tax.

The ZRA administers several specific types of taxes in Zambia, which are generally classified into direct taxes and indirect taxes. The main direct taxes take the form of Personal Income Tax (PIT), Company Income Tax, and various presumptive taxes. PIT is primarily collected from individuals in employment through the Pay As You Earn (PAYE) system. PIT is also chargeable on sole proprietorships with an annual turnover exceeding ZMW5,000,000, as well as on income generated by individuals from partnerships. Company Income Tax applies to corporations generating annual turnover of above ZMW5,000,000. Other direct taxes include Mineral Royalty, which is a payment imposed on mining operations for the extraction of minerals, and property transfer tax, which is chargeable on the transfer of property in Zambia.

Presumptive taxes are imposed on certain types of businesses. The main presumptive taxes in Zambia include Turnover Tax, which targets small and medium-sized enterprises with an annual turnover of ZMW5,000,000 or less; Rental Income Tax, levied on persons generating income from letting of real property; and presumptive taxes for transporters, applicable to individuals and partnerships engaged in public passenger transportation. Other types of presumptive taxes include presumptive taxes for artisanal and small-scale mining operations, and presumptive taxes for betting and gaming establishments.

Indirect taxes take the form of Value Added Tax and Customs and Excise duty. Value Added Tax is a consumption-based tax that is levied on the supply chain at each point where value is added to goods or services. Customs duty is imposed on the value for duty purposes of imported goods and certain goods being exported. Excise Duty is imposed on particular goods or products, whether imported or produced domestically in Zambia, at any stage of production or distribution, by reference to weight, strength, or quantity of the goods or products, or by reference to their value. The ZRA also administers various types of levies, which include Insurance Premium levy, Tourism levy, and various motor vehicle fees, such as the carbon emission surtax.

2.4 Empirical Studies

Several studies have examined the impact of taxation on income inequality. Bahl and Wallace (2020) used a case study approach, analyzing property tax systems in urban areas of the United States using quantitative data analysis and qualitative interviews with local government officials. The study concluded that progressive property taxes can significantly reduce income inequality in urban areas, although their implementation is often hindered by administrative challenges. The main weakness of their approach was that they used a case study design, which limits the generalizability of findings to other contexts, especially rural areas. Avram, Levy, and Sutherland (2019) used the EUROMOD tax-benefit microsimulation model to analyse the redistributive impact of tax policies across European Union (EU) member states from the years 2013 to 2018. The study concluded that tax and transfer systems significantly reduce income inequality in the EU, with social transfers having a more pronounced effect than taxes, and that the redistributive impact varies widely across countries. However, the study focused on EU countries with well-developed tax and transfer systems, limiting its direct applicability to developing countries like Zambia.

Joumard, Pisu, and Bloch (2018) used OECD data to analyze the redistributive effects of taxes and transfers in 30 OECD countries from 2010 to 2017. The study employed both cross-country regression analysis and case

studies. The study concluded that taxes and transfers significantly reduce income inequality in OECD countries, with social transfers having a more pronounced effect than taxes. The effectiveness of redistribution varies based on the design and targeting of these policies. The focus on OECD countries limits the applicability of findings to developing countries with different economic structures and tax systems.

Yang and Greaney (2019) used a difference-in-differences approach with household survey data from 2006 to 2016 to evaluate the impact of tax reforms on income inequality in China. The study revealed that progressive tax reforms have reduced income inequality in China, although the regressive nature of consumption taxes offsets some of these gains. However, the study did not consider the impact of local government tax policies, which can vary significantly within China. Piketty and Qian (2019) used historical data analysis and regression techniques to study the impact of progressive taxation on income inequality in India from 2000 to 2015. The study concluded that progressive income taxes have significantly reduced income inequality in India. However, the effectiveness of these policies is hindered by tax evasion and avoidance. The main limitation of the study was that it did not consider the impact of indirect taxes, which are a significant part of the tax system in India. Jha and Dang (2020) used a panel data analysis with data from twelve Asian developing countries from 2000 to 2018. They employed econometric models to assess the impact of tax policies on income inequality. The study revealed that progressive income taxes and social transfers reduce income inequality in developing Asian countries. However, the overall effectiveness was limited by high levels of tax evasion and the regressive nature of indirect taxes. The study did not account for informal sector incomes, which are significant in many Asian developing countries.

Lustig, Pessino & Scott (2018) used a microsimulation approach with data from Argentina, Brazil, and Mexico from 2010 to 2016 to evaluate the redistributive effects of taxes and welfare programs. They concluded that welfare programs have a more significant impact on reducing income inequality compared to tax policies. Indirect taxes were found to be regressive, negating some of the benefits of direct taxes. However, the study's focus on welfare programs may limit its applicability to contexts where such programs are less developed, such as Zambia.

Joumard and Morgavi (2020) conducted a cross-country analysis using panel data from low- and middle-income countries between 2010 and 2018. They used econometric models to analyse the impact of fiscal policy on income redistribution and poverty reduction. The study concluded that fiscal policies, particularly social transfers, are effective in reducing poverty and income inequality, although the redistributive impact of taxes alone is limited in reducing income inequality. The study's cross-country approach may obscure country-specific factors, making it difficult to generalize findings to individual countries like Zambia. A similar study performed by Sterner and Coria (2018) used a computable general equilibrium (CGE) model to analyse the distributional effects of environmental taxes in developing countries, focusing on the impact of fuel taxes on income distribution. Their study concluded that environmental taxes, such as fuel taxes, can have regressive effects on income distribution if not accompanied by compensatory measures. However, they also generate significant revenue that can be used for social programs. However, the use of a CGE model in their study may oversimplify the complex interactions between environmental taxes and income distribution.

Maboshe, Purfield and Woolard (2019) used a combination of microsimulation models and household survey data from 2010 to 2017 to evaluate the impact of tax and transfer policies on income distribution in South Africa. The study concluded that South Africa's progressive tax system, combined with extensive social grants, significantly reduces income inequality. However, the overall impact was limited by high levels of unemployment and low labour market participation among the poor. The study did not fully account for the informal sector, which plays a substantial role in South Africa's economy and may affect the effectiveness of tax policies. Udo and Bassey (2021) used a computable general equilibrium (CGE) model to simulate the effects of recent tax reforms on income distribution in Nigeria, incorporating data from the National Bureau of Statistics from 2015 to 2020. The study revealed that recent tax reforms in Nigeria, including increases in VAT and excise duties, have had a mixed impact on income distribution, with the reforms exacerbating inequality due to the regressive nature of consumption taxes. However, the study did not consider the compliance rates of different taxes, which may influence the actual redistributive effects. A study performed by Younger, Osei-Assibey and Oppong (2020) used a fiscal incidence analysis with data from the Ghana Living Standards Survey 2016-2017 to assess how taxes and social spending affect poverty and income inequality in Ghana. The study concluded that while direct taxes and social spending in Ghana are progressive and help reduce income inequality, indirect taxes such as VAT are regressive and offset some of these gains. However, the study's cross-sectional design limits the ability to assess long-term impacts of fiscal policies on inequality.

Mburu and Mutua (2021) employed a decomposition analysis of income inequality using data from the Kenya Integrated Household Budget Survey (KIHBS) 2015-2018. The analysis focused on the redistributive impact of taxes and social transfers. The study concluded that Kenya's fiscal policies have a limited impact on reducing income inequality due to the relatively low levels of direct taxes and social spending. Indirect taxes, particularly VAT, are found to be regressive. The study however did not account for regional disparities within Kenya, which may affect the overall assessment of fiscal policy impacts. Kweka and Mung'ong'o (2022) used panel data analysis with data from the Tanzanian National Panel Surveys (2016-2021) to assess the impact of tax policies on inclusive growth and income inequality. The study showed that while progressive income taxes contribute to reducing income inequality, the overall tax system in Tanzania is regressive due to the heavy reliance on indirect taxes. The authors suggested that increasing the progressivity of the tax system could enhance its redistributive impact. However, the study did not explore the administrative challenges of implementing progressive taxes in Tanzania.

de la Fuente, Rosales, and Jellema (2017) performed a comprehensive analysis of how Zambia's fiscal policy influences income inequality and poverty. The study utilised a rigorous methodology to evaluate the redistributive impact of various fiscal elements, such as taxes, direct transfers, and public expenditures on education and health. The study identifies public expenditure on education as the most significant factor in reducing income inequality in Zambia. This finding aligns with broader literature indicating that public investment in education can have substantial redistributive effects, especially in developing countries. The study however, primarily focused on a cross-sectional analysis for the year 2015. There is a need for longitudinal studies that examine the impact of fiscal policies over time to capture the dynamic effects of policy changes on income inequality and poverty,

The empirical studies reviewed above highlight the multifaceted relationship between taxation and income inequality. The studies suggest that taxation plays a significant role in addressing income inequality, though its effectiveness varies based on various factors such as the type of taxes used, the economic context, and the presence of complementary social programs. The reviewed literature underscores the complexity of addressing income inequality through taxation and the necessity of a holistic approach that integrates progressive taxation, robust social transfers, and administrative efficiency to achieve meaningful reductions in inequality, particularly in developing countries like Zambia.

3. Theoretical Framework

3.1 Benefit Received Theory

This theory, which is also known as the quid pro qou theory or the Benefit Principle of Taxation, posits that individuals should be taxed in proportion to the benefits they receive from public goods and services provided by the government. Essentially, this theory suggests that those who benefit more from public services should contribute more in taxes, creating a direct link between tax payments and the receipt of government services . The Public Benefit Received Theory aligns with the principles of equity and fairness in taxation. By ensuring that individuals are taxed based on the benefits they receive, the theory promotes a fair distribution of the tax burden. For example, if the wealthy receive more substantial benefits from government infrastructure and services, taxing them proportionally higher could help address income disparities . The theory encourages efficient allocation of resources by linking tax payments to the benefits received from public goods. This can help ensure that public resources are used effectively and are distributed in a way that benefits the entire population. In most countries, where resources are often limited, this can help optimize the use of public funds and ensure that they are directed towards areas where they have the most significant impact . Critics argue that the Benefit Received Theory may not adequately address equity concerns, especially in societies with significant income disparities. Those with greater ability to pay might not always be the direct beneficiaries of public services, raising questions about fairness and justice (Slemrod & Bakija 2017).

3.2 Ability to Pay Theory

The Ability to Pay Theory advocates for taxes based on an individual's capacity to pay, typically measured by income or wealth. This theory supports progressive taxation, where tax rates increase with the taxpayer's ability to pay, promoting equity and reducing income inequality. The theory aligns closely with principles of equity and social justice. By taxing individuals based on their capacity to pay, the tax system can help reduce income disparities and promote a fairer distribution of wealth. This theory supports the implementation of progressive taxation, where tax rates increase with the taxpayer's ability to pay. Progressive taxes are effective in redistributing income from the wealthy to lower-income groups, thereby reducing income inequality. The

implementation of progressive tax policies based on the Ability to Pay Theory can help in mobilizing resources for social programs that benefit the poor and reduce the wealth gap. By ensuring that the tax burden is distributed according to taxpayers' financial capacity, the Ability to Pay Theory can contribute to economic stability and growth. It avoids overburdening lower-income groups, who are more likely to spend a significant portion of their income on consumption, thereby stimulating economic activity leading to a more balanced and sustainable economic growth (Fuest & Riedel 2009). Tax systems perceived as fair and equitable are likely to experience higher compliance rates, thereby contributing to widening of the tax base (Lustig, Pessino & Scott 2014).

3.3 Public Finance Theory of Taxation

The Public Finance Theory of Taxation is an overarching framework that examines how governments design and implement tax systems to achieve economic and social objectives. This theory addresses the principles of efficiency, equity, and administrative feasibility in the context of raising revenue for public expenditure. It considers the economic impacts of taxation, the optimal allocation of resources, and the redistribution of income to enhance social welfare (Musgrave & Musgrave 1989). By incorporating principles of equity, this theory advocates for progressive taxation, where higher-income individuals and businesses pay a higher percentage of their income in taxes. This can help redistribute wealth and reduce income disparities, aligning with the goals of social justice and poverty reduction (Bird & Zolt 2005).

According to the Public Finance Theory, a well-designed tax system can minimize economic distortions and enhance efficiency which can stimulate economic growth by promoting investment, savings, and productive activities. By carefully balancing different types of taxes and considering their economic impacts, the government can create a tax system that supports sustainable development while ensuring adequate revenue generation (Stiglitz 2015). The theory emphasizes the importance of optimal resource allocation, ensuring that tax revenues are used effectively to fund public services and infrastructure which is crucial for maximizing social welfare. By following the principles of Public Finance Theory, the government can prioritize expenditures that have the most significant positive impact on low-income populations, thereby addressing both poverty and income inequality (Jha & Dang 2020).

Public Finance Theory also addresses the importance of administrative feasibility and tax compliance. A tax system that is easy to administer and enforce reduces the costs of tax collection and increases compliance rates which can enhance revenue collection and broaden the tax base. Simplifying tax laws and improving enforcement mechanisms can help achieve these goals (Fuest & Riedel 2009).

4. Methodology

A description of the data and data sources used in the study is provided in this section. This is followed by a justification of the dependent and independent variables used in the study. Lastly, the empirical model used in the study is described.

4.1 Data and Sources

The data for the study were collected from the Zambia Revenue Authority, Bank of Zambia (BoZ), the Zambia Statistics Agency (ZamStats) and World Bank poverty and inequality publications. The data comprised annual statistics on Zambia's GINI index and national tax revenue collections from Personal Income Tax, Company Income Tax and Value Added Tax for the period 1991 to 2024.

The Gini Index was chosen as the preferred measure of income inequality in Zambia as it is widely accepted measure of income inequality (OECD 2023). The Gini statistics for Zambia were collected from the BoZ's and ZamStats' published economic reports.

Information relating to the tax variables used in the estimation, namely Personal Income Tax, Company Income Tax, and Value Added Tax, was collected from ZRA published annual reports. Customs and Excise Duty could not be included in the estimated model because it was not provided in the attached statistical file.

4.2 Data Analysis Model

A semi-log multiple regression model was used to assess the relationship between tax policy and income inequality in Zambia. The semi-log specification was preferred because the tax variables are monetary values with strong upward trends and wide dispersion over time. Taking natural logarithms reduces scale effects and permits interpretation of the tax coefficients as semi-elasticities of the Gini index.

The theoretical model used in the study is GINI = f(PIT, CIT and VAT). However, because the attached statistical file did not contain CED data, the empirical model estimated in this study is specified as follows:

$$GINI = \beta0 + \beta1\ PIT + \beta2\ CIT + \beta3\ VAT + \mu$$

Where:

GINI = Gini index

PIT = Personal Income Tax

CIT = Company Income Tax

VAT = Value Added Tax

μ = Error Term

$\beta1 - \beta3$ = coefficients of the independent variables in the estimated model

A priori expectation for the estimated model: $\beta1 < 0$, $\beta2 < 0$ and $\beta3 > 0$.

Table 1. Variable definitions

Variable	Type	Definition	Expected correlation between independent and dependent variable
Gini Index (GINI)	Dependent	Measure of income inequality. In this study, it is used as the dependent proxy for the extent to which income is unevenly distributed in Zambia.	Not applicable - dependent variable.
Personal Income Tax (PIT)	Independent	Tax revenue collected from individuals' employment, business and other personal income, including Pay As You Earn (PAYE). It represents direct taxation of individual income.	Negative (-): progressive personal income taxation is expected to reduce the Gini index.
Company Income Tax (CIT)	Independent	Tax revenue collected from company profits. It represents direct taxation of corporate income and business profits.	Negative (-): company profit taxation is expected to reduce inequality where the burden falls mainly on owners of capital and revenue supports redistribution.
Value Added Tax (VAT)	Independent	Tax revenue collected from VAT on taxable supplies and imports of goods and services. It represents broad-based consumption taxation.	Positive (+): VAT is expected to increase the Gini index because consumption taxes tend to be regressive.
Customs and Excise Duty (CED)	Independent	Tax revenue collected from customs duties on imported or exported goods and excise duties on selected goods produced locally or imported.	Positive (+): customs and excise duties may increase consumer prices and are expected to raise the Gini index where the burden falls more heavily on lower-income households.

5. Empirical Results

5.1 Data Preparation and Estimation Technique

The attached statistical file contained 34 annual observations covering the period 1991 to 2024. The variables available for estimation were the Gini index, Personal Income Tax (PIT), Company Income Tax (CIT) and Value Added Tax (VAT).

A data-screening check identified an obvious unit inconsistency in the 2015 CIT observation. The uploaded value was 2,876, whereas the surrounding annual CIT observations are in millions. The value was therefore treated as 2,876,000 in the main estimation to preserve unit consistency. A sensitivity check using the uncorrected value produced the same broad conclusion that CIT is not statistically significant.

The preferred baseline specification is a semi-log multiple regression model in which PIT, CIT and VAT are transformed into natural logarithms. This is more appropriate than estimating the model in raw monetary values because the tax variables are highly skewed and trend strongly over time. The estimated equation is:

$$GINI_t = \beta0 + \beta1\ lnPIT_t + \beta2\ lnCIT_t + \beta3\ lnVAT_t + \mu_t$$

Because the data are annual time-series observations, the model was tested for serial correlation, heteroskedasticity, normality, multicollinearity and unit-root behaviour. The baseline regression is reported with Newey-West/HAC standard errors to reduce the risk of misleading inference where residual autocorrelation is present.

5.2 Descriptive Statistics

Table 2 presents the descriptive statistics for the variables used in the empirical analysis. The mean Gini index over the period was 52.51%, with a minimum of 42.10% and a maximum of 59.10%. This confirms that Zambia remained a high-inequality economy during the period under review. The tax variables display substantial dispersion, which is expected given the long sample period and the strong growth in nominal tax collections.

Table 2. Descriptive statistics

Variable	N	Mean	Std. dev.	Min	Max
GINI	34	52.51	3.85	42.10	59.10
PIT	34	5,617,074.38	6,683,078.34	4,825.00	26,940,000.00
CIT	34	3,877,101.74	5,530,958.78	9,509.00	21,050,000.00
VAT	34	7,267,943.65	10,275,007.28	4,600.00	44,210,000.00

5.3 Correlation Analysis

The simple correlations in Table 3 show weak positive bivariate correlations between the Gini index and the three tax variables. However, the tax variables are very strongly correlated with each other. The correlation between ln(PIT) and ln(VAT) is 0.990, while ln(CIT) is also strongly correlated with both ln(PIT) and ln(VAT). This points to substantial multicollinearity in the level regression and means that individual coefficient estimates must be interpreted cautiously.

Table 3. Correlation matrix

Variable	GINI	ln(PIT)	ln(CIT)	ln(VAT)
GINI	1.000	0.062	0.125	0.144
ln(PIT)	0.062	1.000	0.950	0.990
ln(CIT)	0.125	0.950	1.000	0.960
ln(VAT)	0.144	0.990	0.960	1.000

Note: Correlations are based on the natural logarithms of PIT, CIT and VAT.

5.4 Unit-Root Tests

The Augmented Dickey-Fuller tests in Table 4 indicate mixed stationarity properties. The Gini index is borderline stationary at the 10% level, ln(PIT) is not stationary in levels, while ln(CIT) and ln(VAT) appear stationary at the 5% level. First differences of the variables were stationary. For this reason, the study reports the level model as the baseline model but also reports a first-difference robustness test.

Table 4. Augmented Dickey-Fuller tests in levels

Variable	ADF statistic	p-value	Used lag
GINI	-2.785	0.060	0
ln(PIT)	-1.902	0.331	3
ln(CIT)	-3.014	0.034	10
ln(VAT)	-3.324	0.014	0

Note: The null hypothesis of the ADF test is that the series has a unit root.

5.5 Baseline Regression Results

Table 5 reports the baseline semi-log regression results using Newey-West/HAC standard errors. The model explains approximately 33.5% of the variation in the Gini index, with an adjusted R-squared of 26.9%. The overall F-test is statistically significant at the 1% level, suggesting that the tax variables are

jointly associated with income inequality over the period.

Table 5. Baseline semi-log OLS regression results with HAC standard errors

Variable	Coefficient	Std. Error	t-statistic	p-value
Constant	59.687	6.197	9.631	0.000
ln(PIT)	-6.893	2.187	-3.151	0.004
ln(CIT)	-0.310	1.012	-0.306	0.761
ln(VAT)	6.723	2.144	3.136	0.004

Dependent variable: Gini index. HAC standard errors use Newey-West correction with one lag. N = 34; R-squared = 0.335; adjusted R-squared = 0.269.

The coefficient on ln(PIT) is negative and statistically significant at the 1% level. Holding CIT and VAT constant, a 1% increase in PIT is associated with approximately a 0.069 percentage-point reduction in the Gini index. A 10% increase in PIT is associated with about a 0.657 percentage-point reduction in the Gini index. This result is consistent with the ability-to-pay principle and with the expectation that progressive direct taxation can reduce income inequality.

The coefficient on ln(CIT) is negative but statistically insignificant. This implies that the study does not find clear empirical evidence that company income tax collections independently reduced income inequality during the period. A plausible interpretation is that the distributional effect of CIT is weakened by tax incentives, profit-shifting, informality, loss carry-forwards, sectoral concentration, and uncertainty about whether the economic burden of CIT falls on shareholders, workers, or consumers.

The coefficient on ln(VAT) is positive and statistically significant at the 1% level. Holding PIT and CIT constant, a 1% increase in VAT is associated with approximately a 0.067 percentage-point increase in the Gini index. A 10% increase in VAT is associated with about a 0.641 percentage-point increase in the Gini index. This finding is consistent with the literature that treats broad-based consumption taxes as potentially regressive because lower-income households spend a larger share of their income on consumption.

5.6 Diagnostic and Robustness Tests

The diagnostic statistics in Table 6 confirm that the baseline level model should not be overclaimed. The Durbin-Watson statistic is 0.726, and the Breusch-Godfrey test rejects the null of no first-order serial correlation. This justifies the use of HAC standard errors in the baseline table. The Breusch-Pagan test does not reject homoskedasticity at the 5% level, while the Jarque-Bera test suggests that the residuals are not materially non-normal.

Table 6. Baseline model diagnostics

Diagnostic statistic	Result
Observations	34
R-squared	0.335
Adjusted R-squared	0.269
F-statistic p-value	0.006
Durbin-Watson	0.726
Breusch-Godfrey AR(1) p-value	0.000
Breusch-Pagan p-value	0.118
Jarque-Bera p-value	0.600

Note: Low Durbin-Watson and significant Breusch-Godfrey p-value indicate serial correlation in the level model.

Variance inflation factors are reported in Table 7. The VIF values for ln(PIT), ln(CIT) and ln(VAT) exceed the conventional threshold of 10, with ln(PIT) and ln(VAT) being especially high. This is a serious limitation. It means the tax variables move together over time, making it difficult to separate their independent effects cleanly. The signs of the coefficients are still economically meaningful, but the results should be read as evidence of association rather than proof of causation.

Table 7. Variance inflation factors

Variable	VIF
ln(PIT)	48.79
ln(CIT)	12.67
ln(VAT)	60.87

Note: VIF values above 10 indicate serious multicollinearity.

A first-difference robustness model was estimated to reduce the risk of spurious regression from trending variables. The first-difference specification materially reduced multicollinearity and removed evidence of first-order serial correlation. However, when HC3 robust standard errors are used, the individual coefficients are not statistically significant. The signs remain consistent with the baseline model: changes in PIT are negatively associated with changes in inequality, changes in VAT are positively associated with changes in inequality, and changes in CIT remain statistically weak.

Table 8. First-difference robustness regression with HC3 robust standard errors

Variable	Coefficient	Std. Error	t-statistic	p-value
Constant	0.151	1.324	0.114	0.910
Δln(PIT)	-5.748	5.979	-0.961	0.344
Δln(CIT)	-0.815	2.119	-0.385	0.703
Δln(VAT)	4.672	5.938	0.787	0.438

Dependent variable: ΔGINI. N = 33; R-squared = 0.264; adjusted R-squared = 0.188. HC3 standard errors are used due to heteroskedasticity concerns.

6. Discussion

The empirical findings support a mixed assessment of Zambia's tax policy. The results show that Personal Income Tax is negatively associated with the Gini index, VAT is positively associated with the Gini index, while Company Income Tax has a weak and statistically insignificant association with income inequality. This pattern is broadly consistent with the reviewed literature, which shows that the distributional effect of taxation depends not only on the amount of revenue collected but also on the composition of the tax system and the extent to which tax revenue is converted into pro-poor public expenditure (Joumard, Pisu & Bloch 2012; Lustig, Pessino & Scott 2014; de la Fuente, Rosales & Jellema 2017).

The negative and statistically significant PIT result agrees with the theoretical expectation under the ability-to-pay principle because personal income taxation is designed to impose a heavier burden on taxpayers with greater taxable capacity. This finding is consistent with Joumard, Pisu, and Bloch (2012), who show that income taxes can contribute to redistribution where they are sufficiently progressive and supported by effective administration. It also agrees with studies that emphasise the redistributive role of direct taxes when combined with social expenditure, such as Lustig, Pessino, and Scott (2014) and Inchauste, Lustig, Maboshe, Purfield, and Woolard (2015). However, the finding should be interpreted with caution because it partly differs from Bird and Zolt (2005), who argue that personal income tax has a limited redistributive role in many developing countries because of narrow tax bases, informality, weak compliance, and administrative constraints. In the Zambian context, the PIT result may therefore reflect the redistributive potential of PAYE and formal-sector taxation, but it should not be overstated as proof that PIT alone can substantially reduce inequality.

The positive and statistically significant VAT result agrees strongly with studies that find indirect consumption taxes to be regressive or inequality-enhancing when they are not adequately offset by exemptions, zero-rating, or targeted social transfers. This finding is consistent with Lustig, Pessino, and Scott (2018), who observe that indirect taxes can offset some of the inequality-reducing effects of direct taxes and welfare programmes. It also agrees with Younger, Osei-Assibey, and Oppong (2020), whose Ghanaian fiscal-incidence evidence shows that indirect taxes may reduce the redistributive gains from direct taxes and public spending. Similar conclusions are reported by Mburu and Mutua (2021) for Kenya and Kweka and Mung'ong'o (2022) for Tanzania, where reliance on VAT and other indirect taxes was found to limit the redistributive impact of fiscal policy. The Zambian result, therefore, supports the argument that VAT is efficient for revenue mobilisation but potentially harmful for equity where lower-income households spend a larger share of their income on taxable consumption.

The weak and statistically insignificant CIT result does not support a strong claim that company income tax independently reduced income inequality in Zambia during the period under review. This finding is not unusual. It agrees with the broader argument that the redistributive impact of company taxation is difficult to isolate because the final burden of CIT may fall on shareholders, workers, or consumers, depending on market structure, profit shifting opportunities, and tax incidence (Bird & Zolt 2005; Fuest & Riedel 2009). It is also consistent with Jha and Dang (2020), who argue that tax evasion, avoidance and structural weaknesses can reduce the effectiveness of direct taxation in developing economies. For Zambia, the insignificant CIT result may reflect volatility in mining and corporate profits, sector-specific incentives, compliance gaps, and the fact that corporate tax collections do not automatically translate into lower household income inequality.

Taken together, the results agree with de la Fuente, Rosales, and Jellema (2017), who find that fiscal policy in Zambia can affect inequality, but that the strongest redistributive effects are likely to come from the combined operation of taxes and well-targeted public expenditure, especially education and social spending. The results also agree with Joumard and Morgavi (2020), who conclude that taxes alone have limited redistributive power unless they are supported by transfers and broader fiscal policy. Therefore, the evidence from this study does not support a simplistic conclusion that higher tax revenue automatically reduces income inequality. The structure of taxation matters: progressive direct taxation appears more consistent with inequality reduction, while heavy reliance on VAT may weaken equity outcomes. The policy implication is that Zambia should strengthen PIT compliance and progressivity, improve CIT enforcement without discouraging productive investment, and protect poor households from the regressive effects of VAT through carefully designed zero-rating, exemptions, and targeted social spending.

7. Conclusion

This study aimed to assess the effect of taxation on income inequality in Zambia using annual data for the period from 1991 to 2024. The empirical evidence shows that Personal Income Tax is negatively and significantly associated with the Gini index, VAT is positively and significantly associated with the Gini index, and Company Income Tax does not have a statistically significant effect in the baseline model. These findings are broadly consistent with the theoretical expectation that direct progressive taxes can reduce inequality while broad-based consumption taxes may worsen inequality.

The current study also has some limitations. Customs and Excise Duty were not covered in study. The Gini series contains repeated values across several years, and the tax variables are nominal collections rather than tax-to-GDP ratios or real per-capita measures. The results should therefore be interpreted as indicative associations, not definitive causal estimates. Future research should use real tax variables, tax-to-GDP ratios, Customs and Excise Duty, social expenditure variables, and household-level fiscal incidence data to produce stronger causal evidence.

8. Policy Implications

The main policy implication is that Zambia should not rely on revenue mobilisation alone as evidence of tax progressivity. A tax system can raise revenue and still worsen inequality if the burden falls disproportionately on lower-income households. Policymakers should therefore strengthen the progressivity and coverage of PIT, improve CIT compliance and limit excessive tax incentives, and ensure that VAT revenue is matched with targeted social spending that protects poor households.

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Appendix 1. Annual Gini Index and Tax Revenue Statistics, 1991-2024

The following annual statistics were used in the empirical analysis.

Table A1. Annual Gini index, Personal Income Tax, Company Income Tax and Value Added Tax statistics

No.	Year	Gini index (%)	PIT	CIT	VAT
1	1991	59.1	4,825	9,509	4,600
2	1992	59.1	21,464	15,651	12,765
3	1993	52.6	41,859	39,487	34,394
4	1994	52.6	86,202	43,011	76,104
5	1995	52.6	134,163	38,355	107,679
6	1996	48.3	172,703	49,366	136,854
7	1997	48.3	236,313	60,080	183,688
8	1998	49.1	291,000	90,000	200,000
9	1999	49.1	222,000	483,000	248,000
10	2000	49.1	278,000	634,000	230,000
11	2001	49.1	366,000	953,000	278,000
12	2002	42.1	965,000	276,000	342,000
13	2003	42.1	1,364,000	246,000	393,000
14	2004	54.3	1,696,000	332,000	1,362,000
15	2005	54.3	1,968,000	448,000	1,633,000
16	2006	54.6	2,207,000	695,000	1,792,000
17	2007	54.6	2,493,000	1,339,000	2,231,000
18	2008	54.6	3,045,000	1,633,000	2,201,000
19	2009	54.6	3,720,000	1,820,000	3,240,000
20	2010	52.0	5,010,000	3,140,000	4,080,000
21	2011	52.0	5,760,000	4,610,000	5,040,000
22	2012	52.0	6,240,000	5,510,000	6,630,000
23	2013	52.0	7,190,000	3,630,000	9,570,000

No.	Year	Gini index (%)	PIT	CIT	VAT
24	2014	52.0	8,000,000	4,320,000	11,780,000
25	2015	55.8	7,444,000	2,876,000	8,237,000
26	2016	55.8	8,146,000	4,043,000	7,957,000
27	2017	55.8	8,685,000	4,455,000	13,887,000
28	2018	55.8	9,807,000	4,920,000	17,352,000
29	2019	55.8	11,625,000	7,916,000	16,685,000
30	2020	55.8	14,229,000	9,530,000	14,532,000
31	2021	55.8	14,972,000	19,506,000	18,956,000
32	2022	51.5	18,102,000	21,050,000	20,580,000
33	2023	51.5	19,518,000	14,931,000	32,908,000
34	2024	51.5	26,940,000	12,180,000	44,210,000