REPOA
Knowledge is Power

Tax policies and informality in Tanzania

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▶ Research Report 2024/11

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Abstract

This study examines the relationship between tax policies and informality in Tanzania. Specifically, it analyses how changes in tax policies affect the behaviour of individuals in the labour market and how these changes impact the level of inequality and poverty in Tanzania. Tanzania's informal economy, accounting for over 60% of employment and nearly 40% of GDP, remains largely outside the tax net, contributing just 1.8% to national tax revenues. Using a computable general equilibrium (CGE) model integrated with microsimulation, the study simulates the impact of different tax reforms (1) the imposition of a flat personal income tax on informal households, (2) combining the income tax with a 1% Value Added Tax (VAT) reduction on essential goods consumed by informal households, and (3) a 5% increase in corporate income tax on formal firms on the labour market, income distribution, and government revenue. Findings reveal that taxing the informal sector may induce higher labour force participation as individuals substitute leisure with work, potentially encouraging a partial shift toward the formal sector. However, increased taxation disproportionately affects unskilled informal workers, reducing their real wages and exacerbating income inequality and poverty. The simulation also shows that VAT reductions can mitigate adverse welfare effects on poor households. Conversely, increasing corporate income tax reduces demand for unskilled labour in formal firms, further reinforcing informality. Therefore, while there is potential to expand the tax base and enhance revenue through taxation of the informal sector, such reforms must be carefully balanced with targeted compensation measures to avoid unintended social costs. Policy recommendations include improving tax compliance, reducing compliance costs, and implementing pro-poor tax relief measures to support inclusive growth and fiscal sustainability.

1. Introduction

1.1 Context of the study

Taxation is a critical tool for revenue generation, enhancing economic growth and sustainability, regulating market externalities, as well as enhancing state accountability (Mullins et al., 2020[1]; Mpofu, 2021[2]). Like most African countries, effective domestic revenue mobilization in Tanzania is confounded by the presence of a huge informal sector (Meagher, 2018[3]; Makochekanwa, 2020[4]; Sebele-Mpofu and Msipa, 2020[5]). The informal sector relates to a diverse range of productive activities operating on the periphery of state regulations related to the environment, tax, and labour laws, but are often subjected to governance and regulation by local authorities and these are neither normally monitored nor included in the Gross Domestic Product (GDP) of countries. Further, the sector is often characterised by the prevalence of cash transactions (as well as barter trade in some instances) and poor accounting, as well as the absence of records.

The informal sector in Tanzania comprises many microenterprises and small businesses employing a considerable proportion of the labour force. Despite difficulties associated with the documentation of the sector (Kundt, 2017a), it is estimated to contribute around 40 percent and over 60 percent of GDP and employment, respectively in Tanzania (Dube and Casale, 2016; Mbilinyi and Mutalemwa, 2010). Owing to challenges in quantifying the magnitude of the sector in terms of employment, turnovers, and value exchanged, taxation of the informal sector has traditionally been fraught with difficulties in the determination of potential and effort required. Further, because of its relatively low entry barriers, the informal sector has historically served as a politically useful medium for the absorption of excess supply of labour, thus helping to suppress politically sensitive unemployment data in many African countries. This has further contributed to the complexity of taxing the informal sector from a political rents perspective as well as the increased holding power of sector participants.

Based on the national definition, the informal sector constitutes enterprises owned by individuals or households that are not constituted as separate legal entities independent of their owners, have no complete set of accounts, produce some of their

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[1] Mullins, P., Gupta, S., & Liu, J. (2020). Domestic revenue mobilization in low-income countries: Where to from here. *Center for Global Development Policy Paper*, *195*.

[2] Mpofu, F. Y. S. (2021). Informal Sector Taxation and Enforcement in African Countries: How plausible and achievable are the motives behind? A Critical Literature Review. *Open Economics*, *4*(1), 72-97.

[3] Meagher, K. (2018). Taxing times: Taxation, divided societies and the informal economy in Northern Nigeria. *The Journal of Development Studies*, *54*(1), 1-17.

[4] Makochekanwa, A. (2020). Informal economy in SSA: Characteristics, size and tax potential.

[5] Sebele-Mpofu, F. Y., & Msipa, C. (2020). Feasibility of Administering Informal Sector Taxation: Approaches and Hurdles. A Case of the Informal Sector in Bulawayo, Zimbabwe. *International Journal of Innovative Science and Research*, *5*(2), 193-208.

goods for sale and their employment size is below five (5) employees (NBS, 2020)[6]. Individuals and firms in the informal sector are not registered and are unregulated, and therefore not in the standard tax net. Bongwa (2009)[7] refers to it as "hard to tax," and according to Mbilinyi and Mutalemwa (2010)[8], the sector is largely comprised of unregistered and difficult-to-tax groups, which include "small-scale traders, farmers, small manufacturers, craftsmen, individual professionals, and many small-scale businesses".

Tax administration and policy design have featured in contemporary discussions on how to mobilize more revenue for struggling developing country governments. Taxation is not only a tool for revenue mobilization, but it can also be equally considered as one to foster redistribution of wealth, minimize inequality, and stimulate representation among the citizens of any country (Bongwa, 2009[9]; Meagher, 2018[10]; Rogan, 2019[11]). Yet despite these significant contributions, the informal sector's incomes are said to be very low, and not much revenue can be mobilized from the sector, even for those large informal firms who have the potential to contribute significantly to the tax basket, the "political economy of taxation" becomes a stumbling block (Mashiri, 2018[12]; Meagher, 2018[13]; Meagher & Lindell, 2013[14]; Resnick, 2019[15]). Consequently, the sector is only estimated to account for 1.8 percent of national tax revenues in Tanzania.

Studies by Bosch and Esteban-Pretel (2012, 2015), Galiani and Weinschelbaum (2012) and Ulyssea (2018) show that high prevalence of informal employment is more like associated with high labour tax rates. Thus, an increase in tax rates is likely to be an incentive for individuals to operate informally or a trigger factor for the reallocation of the labour force from the formal sector to the informal. In many cases, tax reforms are often accompanied by excessive regulations, which can be cumbersome to the labour market. Empirical evidence suggests a linear relationship between the increase in

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[6] 6 National Bureau of Statistics (NBS) [Tanzania]. (2022). Tanzania Integrated Labour Force Survey 2020/21

[7] Bongwa, A. (2009). *Managing Ethiopian cities II: Informality in Ethiopia: Taxing the hard to tax* (No. IHS WP 22).

[8] Mbilinyi, A. and Mutalemwa, D. 2010. Informal Sector Taxation in Tanzania. The Economic and Social Research Foundation, TAKNET Policy Brief Series No. 012 – 2010.

[9] Bongwa, A. (2009). Managing Ethiopian cities II: Informality in Ethiopia: Taxing the hard to tax (No. IHS WP 22).

[10] Meagher, K. (2018). Taxing times: Taxation, divided societies and the informal economy in Northern Nigeria. The Journal of Development Studies, 54(1), 1-17.

[11] Rogan, M. (2019). Tax Justice and the Informal Economy: A Review of the Debates. Women in Informal Employment: Globalizing and Organizing (WIEGO).

[12] Mashiri, E. (2018). Regulating Multinational Enterprises (MNEs) transactions to minimize tax avoidance through transfer pricing: Case of Zimbabwe. PhD. University of South Africa.

[13] Meagher, K. (2018). Taxing times: Taxation, divided societies and the informal economy in Northern Nigeria. The Journal of Development Studies, 54(1), 1-17.

[14] Meagher, K., & Lindell, I. (2013). ASR Forum: Engaging with African informal economies: Social inclusion or adverse incorporation?: Introduction. African Studies Review, 56(3), 57-76.

[15] Resnick, 2019

taxation and the growth of informal employment (Joshua et al., 2013[16]; Mbaye, 2018[17]). Most African politicians are not committed to having the informal sector taxed, risking stepping on the toes of their colleagues or even losing substantial votes from this sector during elections (Bird, 2007[18]; Bird and Zolt, 2008[19]).

Tanzania, like many other developing countries, is constrained by a budgetary deficit due to its limited fiscal space, as well as increased government spending, which creates huge pressure on revenue mobilization (Semboja et al., 2022[20]). Governments are continuously trying to find new sources of revenue or find more efficient fiscal policies to enhance growth and reduce inequality, especially in developing countries (Lemelin and Savard, 2022[21]). The new sources of public revenue enable the financing of investments in human capital, infrastructure, and the provision of services to households and businesses.

A narrow tax base and wide prevalence of the informal sector pave the way for ineffective revenue mobilization (Semboja et al., 2023). The demand for improved domestic revenue mobilization has seen many economies including Tanzania engage in various tax reforms as a means of maximizing revenues. Tax reforms are an inevitable policy tool used by many governments for development planning and enhancing efficiency in tax collection (Ahmad et al., 1991[22]). Tax policies play a huge role in influencing individuals' labour supply decisions, whereby an individual may choose to work as a formal worker, work in the informal sector, or not work at all, depending on the maximum utility derived from the chosen option. Thus, implementing effective tax policies in the informal sector might be beneficial for both individuals and the economy as a whole. There are two main reasons for the political initiatives to tax the informal sector:

- expanding the tax base, as taxation of more people creates accountability of the government to a larger number of its people, particularly the poor[23];
- The emergence of a taxpaying culture may also be a positive outcome, building a culture of tax compliance among small enterprises and informal workers and

[16] Joshi, Anuradha, Wilson Prichard & Christopher Heady. 2013. Taxing the Informal Economy: Challenges, Possibilities and Remaining Questions. IDS Working Paper No. 429

[17] Mbaye A. (2018). Improving the Contribution of the Informal Economy to GDP Growth. In Race to the Next Income Frontier How Senegal and Other Low-Income Countries Can Reach the Finish Line. IMF https://doi.org/10.5089/9781484303139.071

[18] Bird, R. M. (2007). Tax challenges facing developing countries: A perspective from outside the policy arena. Available at SSRN 1393991.

[19] Bird, R. M., & Zolt, E. M. (2008). Technology and taxation in developing countries: From hand to mouse. National Tax Journal, 61(4), 791-821.

[20] Semboja, Joseph., Kamugisha, Mugisha., Msafiri, Derick., (2022). Analysis of tax revenue mobilization in Tanzania. REPOA research report.

[21] Lemelin A., Savard, L. (2022). What do CGE models have to say about fiscal reform? Economic Analysis and Policy, 2022, vol. 74, issue C, 758-774

[22] Ahmad, E., Ahmad, E., & Stern, N. (1991). The theory and practice of tax reform in developing countries. Cambridge University Press

[23] http://www.ictd.ac/theme/tax-and-governance

a reduced sense of unfairness that might also increase compliance amongst formal companies[24].

When tax policy reforms are envisaged, computable general equilibrium (CGE) models are often used to evaluate the impact of the reform, for example, in Harberger 1962[25]; Shoven and Whalley 1972[26]; Kehoe et al., 1988[27]; Fortin et al., 1997[28]; Piggott et al., 2001[29]; Llambi et al., 2016[30]. We follow this practice in this study and respond to REPOA's expressed wish to conduct a comprehensive assessment of how changes in tax policies affect the behaviour of individuals in the labour market and how these changes impact the level of inequality and poverty in Tanzania.

1.2 Research questions and objectives

Overall, the study examines how changes in tax policies affect the behaviour of individuals in the labour market and how changes in tax policies affect the level of inequality and poverty in Tanzania. Specifically, this study focused on the following research objectives:

- To analyse the status of employment taxes in Tanzania.
- To analyse the existing fiscal policies geared to promote decent work in Tanzania.
- To estimate the effect of tax policies on the labour supply responses in the Tanzanian labour market.
- To estimate the effects of tax changes on poverty and inequality in Tanzania.

This study employs a computable general equilibrium (CGE) model integrated with a microsimulation model to assess the impacts of tax policy measures on workers in the informal and formal labour markets, overall economy, poverty, and inequality. The study uses the 2022 Tanzanian Social Accounting Matrix (SAM) updated from the original 2015 Tanzanian SAM developed by IFPRI researchers (Randriamamonjy J. and Thurlow J., 2017[31]) and the National Household Budget Survey 2017/18 for the microsimulation model.

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[24] https://actionaid.org/sites/default/files/publications/informal_sector_taxes.pdf

[25] Harberger, A. (1962). The Incidence of Corporate Income Tax. Journal of Political Economics, 97, 109-138

[26] Shoven, J. and Whalley, J. (1972). A General Equilibrium Calculation of the Effects of Differential Taxation of Income from Capital in the U.S. Journal of Public Economics, 1(3), 281-321

[27] Kehoe, T., A. Manreas, P., Noyolo, C., and Sancho F. (1988). A General Equilibrium Analysis of the 1986 Tax Reform in Spain. European Economic Review, 32, 334-342

[28] Fortin, B., Marceau, L., Savard, N., 1997. Taxation, wage controls, and the informal sector: An applied general equilibrium approach. J. Public Econ. 66 (2), 293–312

[29] Piggott, J., Whalley, J., 2001. VAT base broadening, self-supply, and the informal sector. Am. Econ. Rev. 91 (4), 1084–1094

[30] Llambi, C., Laens, S., Perera, M., 2016. Assessing the impacts of a major tax reform: A CGE-microsimulation analysis for Uruguay. Int. J. Microsimul. 9 (1), 134–166.

[31] Randriamamonjy J. and Thurlow J. (2017). 2015 Social Accounting Matrix for Tanzania a Nexus Project SAM. Washington, DC: IFPRI

A literature review was used to address the first and second objectives, while the third and fourth objectives, three policy simulations focusing on personal income tax for informal households, value-added tax, and corporate tax for formal firms were analysed. Simulation results show that informal workers respond to an increase in income taxation by increasing labour market participation, which consequently affects their consumption levels, and increase poverty and inequality.

2. Existing tax and fiscal policies to promote decent work in Tanzania

2.1 Trends in Revenue Mobilization

In recent decades, various fiscal reforms have been implemented in Tanzania. This has resulted in improved domestic revenue collection and the success of a country's fiscal policy in achieving its economic policy objectives (Osoro, 1994; IMF, 2015; URT, 2022). Figure 1 shows the fiscal indicators of the Tanzania national budget for the past decade. Over the past decade, the tax-GDP ratio has ranged to an average of 12 percent with a notable high tax-GDP ratio of 13.2 percent in 2016/17 (Figure 1). However, these ratios have overall varied over time. A progressive increase in the tax GDP ratio was noted between 2014/15 to 2016/17 and a slight decline between 2019/20 and 2020/21. These notable tax-to-GDP ratios are relatively low compared to the average rate of the tax-to-GDP ratio of 15 percent for the East African region recommended by the IMF (IMF, 2018). This ratio indicates that Tanzania does not bear a high tax burden. Given the low tax-to-GDP ratio, the Tanzanian government must raise the tax revenue to GDP ratio to address deficiencies in the budget and to finance development expenditures.

Figure 1. Tax revenue to GDP in Tanzania, 2010/11 – 2020/21
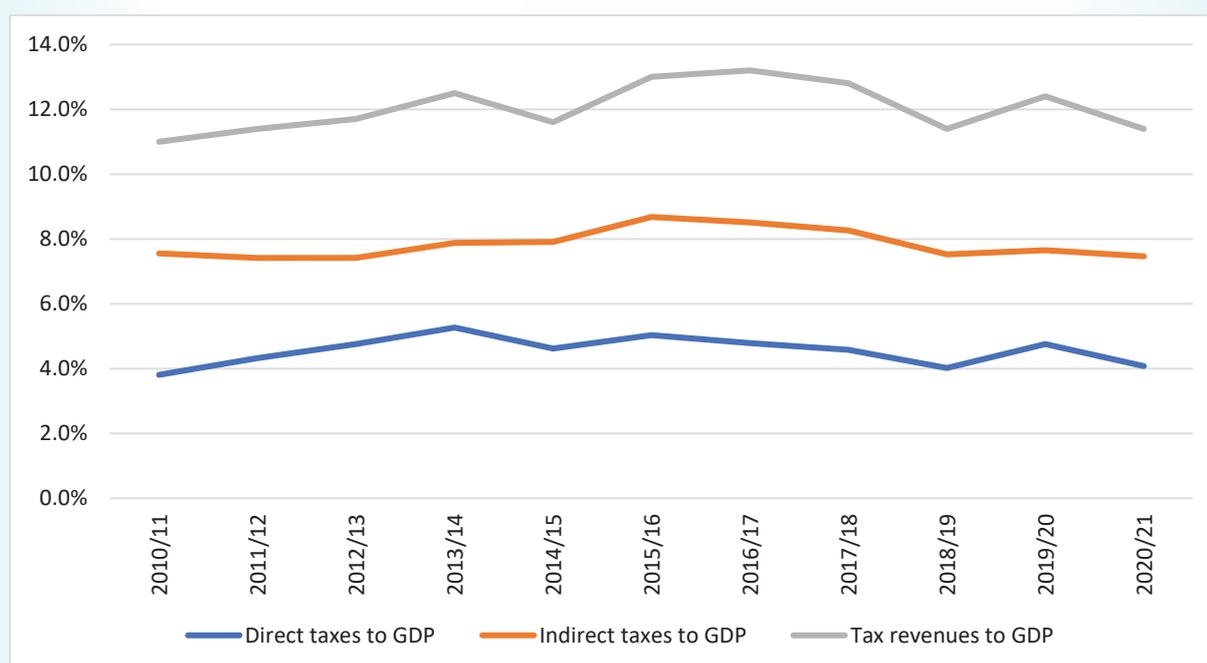
Source: Authors, based on TRA and NBS data

As Table 1 shows, revenues from income taxes are a much smaller proportion of total tax revenues in the observed period. Personal income taxes average about 15.2percent of total tax revenues (and 2percent of GDP).

Table 1. Personal, corporate, and total income tax in selected years

Year	Percentage of GDP			Percentage of central government taxes		
	Personal income tax	Corporate tax	Total income tax	Personal income tax	Corporate tax	Total income tax
2012	2.2	1.7	5.1	17.4	12.9	39.2
2013	2.2	2.0	5.4	16.5	15.0	40.2
2014	2.1	1.4	4.8	16.4	11.1	37.0
2015	2.4	1.5	5.2	17.0	10.4	36.8
2016	2.1	1.3t	4.7	16.0	10.2	36.0
2017	2.0	1.4	4.6	15.4	10.9	35.7
2018	1.9	1.2	4.2	15.4	10.0	34.8
2019	1.8	1.8	4.9	14.3	14.4	38.3
2020	1.5	1.4	4.2	12.3	12.1	35.3
2021	1.5	2.0	4.6	11.1	15.0	33.8
Average	**2**	**1.6**	**4.8**	**15.2**	**12.2**	**36.7**

Source: Authors, based on TRA and NBS data

Based on this analysis, the share of personal income tax to total tax revenue or GDP has changed over the past decade. Table 2 sets forth the role of the personal income tax in Tanzania from 2012 to 2021. If "learning to tax" means increasing the role of income taxes, particularly personal income taxes, this lesson has not yet been learned in many developing countries, including Tanzania. Moreover, while it is difficult to find comparable information on the nature of the income base, Gandhi (1987)[32] showed that the effective scope of personal income taxes in developing countries was much narrower than in developed countries, a picture that is likely still valid today. Not only is income from the shadow or informal sector not taxed but much income from capital also escapes tax, either through legislative grace or tax avoidance or evasion. In addition, the proportion of wage income subject to tax is smaller owing to the relatively lower share of employment in large formal sector enterprises.

Tax reform efforts are often focused on the administration side (e.g. attempts to increase the size of the tax base by expanding registration, encouraging formalization, and monitoring compliance), rather than the tax policy side. For example, Gupta and Jalles (2020)[33], using a sample of 45 developing countries, show that revenue administration reforms outperformed reforms to Personal income Tax (PIT) and that in 119 reform years, only 17 involved a policy reform that was not accompanied by an administration reform.

It is well known that in many low- and middle-income countries (LMICs), a large share of the workforce operates informally, outside the purview of the Personal Income Tax

[32] Gandhi, V. P. (1987). Supply-side tax policy: Its relevance to developing countries. Washington: International Monetary Fund
[33] Gupta, S. and Jalles, J.T. (2020) 'Tax revenue reforms and income distribution in developing countries. CGD Policy Paper 175. Washington DC: Center for Global Development (www.cgdev.org/publication/tax-revenue-reforms-and-income-distribution-developingcountries)

(PIT) and social security nets. The high informal employment rate has remained significant in Tanzania over the years. According to Arvil et al., 2013[34], factors contributing to informality in Tanzania include low per capita income, a low institutionalization rate in the private sector, underdeveloped capital and money markets, and an inefficient tax system.

There is a little research evidence on the tax burdens facing those in formal employment in LMICs where taxes on employment income – usually termed as personal income tax or Pay As You Earn (PAYE)[35] – are often characterized by complexity, high marginal rates, and ad hoc reforms. PIT often 'kicks in' at low levels of income and the rates can climb steeply meaning that, all else equal, an individual in formal employment in a low-income country (LIC) can be faced with relatively high effective tax rates.

Due to narrow PIT bases in most LMICs, PIT collections as a percentage of GDP are comparatively low, at around 2.55percent in LICs compared to 6.93percent in high-income countries, on average (UNU-WIDER, 2021). By 'narrow' PIT bases, we refer to the small proportion of workers with a formal contract of employment and hence employment income, and the level of evasion and avoidance on both the intensive margin and extensive margin across income sources, including earned and capital income. Concurrently, there is perhaps a temptation for policymakers to then set high rates to squeeze as much revenue as possible from a small base. But this has important implications for taxpayer behaviour on the intensive and extensive margins, morale, and perceptions of (or trust in) the revenue authority and the fiscal contract between state and citizens overall.

It should be noted that the re-distributive effects of taxes are minor in developing countries (Chu et al., 2000[36]). This can largely be explained by the fact that the tax structure is dominated by indirect taxes (such as sales taxes) which tend to be regressive. In terms of income taxes, in most developing countries, including Tanzania, income taxes are progressive only for certain ranges of income (see Section 2.2). Earlier studies (Engel. et al., 1999[37]) of the incidence of progressive income taxes suggest that the magnitude of the redistribution that can be achieved through personal income taxes is small given the distribution of income and the nature of the income tax. Interestingly, recent studies of the incidence of progressive income taxes show that progressive direct taxation is necessary to complement social protection to reduce

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[34] Arvil V. Adams, Sara Johansson da Silva, and Setareh Razmara (2013). Skills Development in the Informal Sector: Tanzania https://doi.org/10.1596/9780821399682_CH09

[35] PAYE is a form of withholding tax for collection on individual employment income, which may contribute to PIT, and is typically imposed on all sources of income

[36] Chu, Ke-young et al. (2000). Income distribution and tax and government social spending policies in developing countries. UNU World Institute for Development Economic Research Working Paper No. 214

[37] Engel, E.M.R.A.. et al. (1999). Taxes and income distribution in Chile: Some unpleasant redistributive arithmetic. Journal of Development Economics, 59, 155–192

income inequality (Cobham et al., 2021[38]). Furthermore, taxpayers could increase (decrease) their willingness to pay taxes when they receive accurate information that taxes in their country are progressive or not (Hoy, 2022[39]).

Another illustrative example is the system of presumptive taxation, which is widespread throughout the world (Bird and Wallace, 2004[40]). Presumptive taxation involves simple and cost-effective techniques to capture domestic transactions and sources of income that frequently escape taxation under conventional norms. The estimated tax base is based on coefficients presumably associated with income generation such as sales, turnover, number of employees, size of firm, assets of the taxpayer, etc. Presumptive tax approaches can play a useful role in imposing some form of taxation on business income, especially in the informal sector of the economy (Balestrino and Galmarini, 2005[41]). From the equity perspective, taxing those in the informal sector would alleviate concerns among formal sector taxpayers who view the non-payment of taxes by those with similar incomes in the informal sector as unfair (Fjeldstad and Heggstad, 2011[42]; Dube and Casale, 2016[43]).

Any discussion of personal income tax in developing countries must start with the observation that this tax has yielded relatively little revenue in most of these countries and that the number of individuals subject to this tax (especially at the highest marginal rate) is small. The rate structure of the personal income tax is the most visible policy instrument available to most governments in developing countries to underscore their commitment to social justice and hence to gain political support for their policies. Countries frequently attach great importance to maintaining some degree of nominal progressivity in this tax by applying many rate brackets, and they are reluctant to adopt reforms that will reduce the number of these brackets.

Direct income taxes play little role in Tanzania's budget revenue, yielding on average about 2 percent of GDP in revenue (Table 2). This question is particularly salient concerning the personal income tax (PIT). Its contribution to the tax revenue collection has been less than 2percent since 2016. Like other taxes, PIT could be an important source of budget revenue if it is effectively applied to the informally employed population in the country. A well-designed PIT may also play a key role in redistributing income and may be potentially important in strengthening the political base for sound

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[38] Cobham A., FitzGerald E. and Janský P. (2021): "Estimating Tax Progressivity in Developing Countries: The Plato Index" IES Working Papers 35/2021. IES FSV. Charles University

[39] Hoy, C. (2022). How Does the Progressivity of Taxes and Government Transfers Impact People's Willingness to Pay Tax? Experimental Evidence across Developing Countries. World Bank. Policy Research Working Paper 10167

[40] Bird, R., & Wallace, S. (2004). Is it really so hard to tax the hard-to-tax? The context and role of presumptive taxation. In J. Alm, J. Martinez-Vazquez, & S. Wallace (Eds.), Taxing the hard-to-tax; lessons from theory and practice. Amsterdam: Elsevier

[41] Balestrino, A., & Galmarini, U. (2005) On the Redistributive Properties of Presumptive Taxation. CESifo Working Paper No. 1381

[42] Fjeldstad, O & Heggstad, K 2011, 'The tax systems in Mozambique, Tanzania and Zambia: Capacity and constraints', CMI Report No. 3, Bergen, Christian Michelsen Institute

[43] Dube, G. and Casale, D. (2016). The implementation of informal sector taxation: Evidence from selected African countries

government. Taxpayers are more willing to pay taxes if they believe that governments spend tax revenues on programs that benefit people like them or programs they value, that others are paying their fair share of tax, and that they have some role in making tax and spending decisions (Brautigam, Fjeldstad and Moore, 2008).

While it is often both politically and administratively easier to raise needed revenues through indirect taxes like VAT and excise taxes, in Tanzania, for example, with high levels of income and wealth inequality, a well-designed PIT can play an important role in raising revenue, reducing informality and inequality, and in developing a more inclusive society.

A related question is about which tax structure mobilizes revenue most efficiently. All taxes generate distortions but in a context of limited institutional capacity, income taxes could have higher efficiency costs and be more easily evaded and avoided, making other tax instruments more desirable on efficiency grounds (Gordon and Li 2009; Boadway, Marchand, and Pestieau 1994). Indeed, some empirical studies have ranked taxes relative to their effects on growth and found that consumption taxes tend to be more growth-friendly, a consideration that can be particularly important for LICs.

2.2 Employment tax rates reforms in Tanzania

We use the term 'employment income taxes' to refer to any mandatory personal income tax (most often in the form of PAYE), surtax, levy, compulsory contribution, and employee social security contribution (SSC) levied on a worker in formal wage employment.

In Tanzania, taxation of income from employment is regulated by the 2004 Income Tax Act[44]. According to this Act, "employment" is defined as – (a) a position of an individual in the employment of another person; (b) a position of an individual as manager of an entity other than as a partner of a partnership; (c) a position of an individual entitling the individual to a periodic remuneration in respect of services performed; or (d) a public office held by an individual, and (e) includes a past, present and prospective employment. The general rule is that income from employment is "the individual's gains or profits from any employment for a year of income".

In Tanzania, the employment tax cost borne by employers and ultimately investors arises as a consequence of four items:

Pay As You Earn (PAYE)

Tax resident individuals are subject to income tax based on marginal tax rates depending on their taxable (employment) income. The minimum marginal tax rate is 8 percent while the maximum marginal tax rate is 30 percent. Non-resident employees are taxed at a flat rate of 15 percent on their employment income sourced in Tanzania over the past decade, PAYE as a percent of GDP ranged at an average of 2 percent

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[44] Practice Note No10.pdf (tra.go.tz)

(Figure 2) while PAYE as a percentage of total tax revenues and total revenues stood at an average of 15.8percent and 14.4percent respectively.

Figure 2: PAYE as a percentage of GDP, Total Tax revenues and Total Revenues 2010/11-2020/21
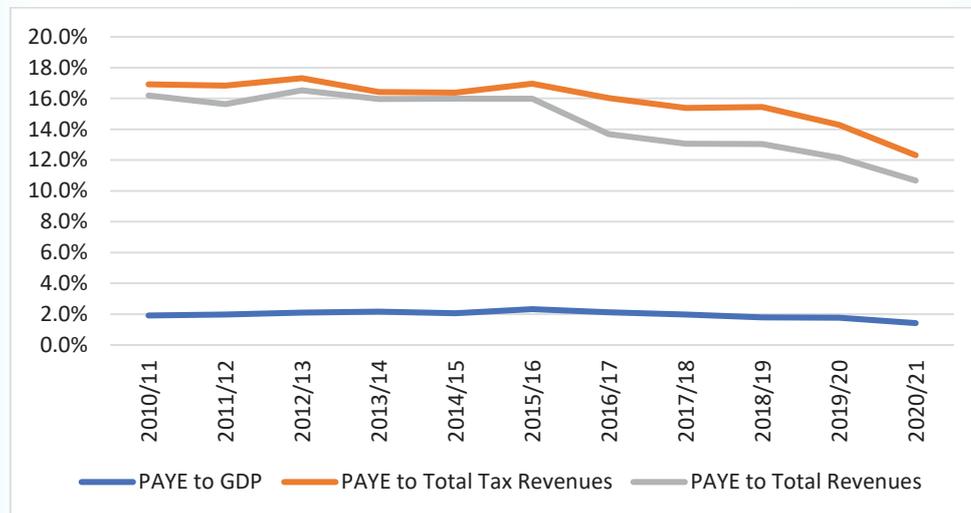
Source: Ministry of Finance

Skills and Development Levy (SDL)

A person (employer) who has employed ten or more employees is liable to pay SDL at the rate of 3.5 percent on the monthly gross cash emoluments of the employees. Over the past decade, SDL as a percentage of GDP stood at an average of 0.2 percent (Figure 3) while SDL as a percent of total tax revenues and total revenues stood at an average of 1.9 percent and 1.7 percent respectively.

Figure 3: SDL as a percentage of GDP, Total Tax revenues and Total Revenues 2010/11-2020/21
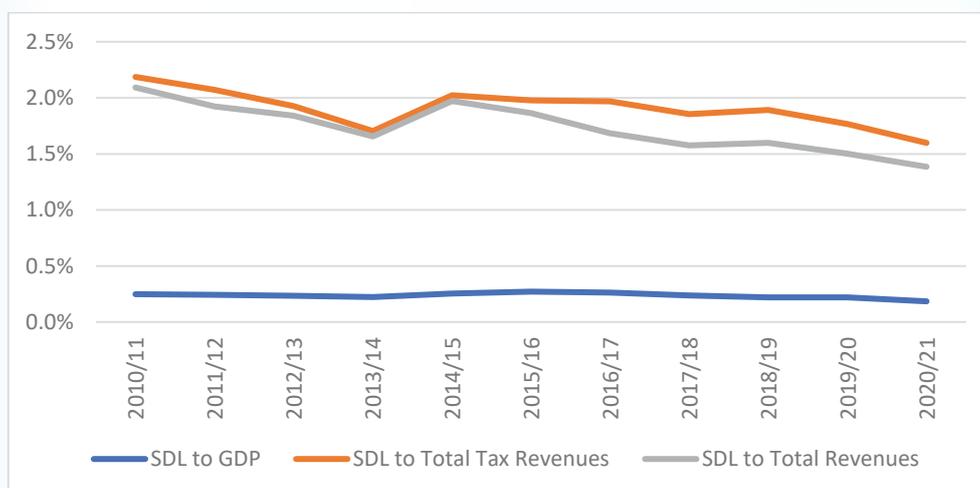

Source: Ministry of Finance

Social Security Contributions while Doing Business in Tanzania

While setting up a business in Tanzania, there is a mandatory social security contribution requirement of 20 percent of an employee's remuneration. The 20 percent contribution is calculated on "wages" which is defined to only encompass cash payments. The contribution obligation falls on the employer but with the right to recover up to half of the amount (i.e. 10 percent) from the employee via deduction from wages. The standard split in practice is 10 percent employer and 10 percent employee (other options are 20 percent employer and 0 percent employee or 15 percent employer and 5 percent employee).

Workers' Compensation Fund (WCF) contributions

All employers are also required to contribute to the WCF. Contributions are aimed to provide compensation to employees injured or incapacitated in the course of employment and in case of death for their dependents. The contribution is payable monthly and is calculated as a percentage of cash sums paid to employees at 0.5 percent. Employers are also required to file a monthly return form.

The employment tax regime in Tanzania consists of several direct taxes such as PAYE and non-resident taxpayers with Tanzania source income. Between 2010 and 2023 in Tanzania, we observed two distinct reforms to PAYE, one in 2012 and another in 2023 (see Table 2). We see that, in the 2012 reform, the rate for minimum income was altered, with 5 percentage points cut from the minimum marginal rate without increasing the band. Interestingly, the width of the bands remained constant in both reform episodes. The 2023 reform realized only a change in the size of the zero band, which increased by an average of 2.5 times, and the bottom rate, which fell further to 8 percent. We also observe a tendency for reform to increase thresholds for each band but keep constant the width of bands. Over time, this implies that the bands, in real terms, get narrower and rates climb more steeply.

Table 2. Marginal PAYE rates and bands in Tanzania, 2012-2023

2012-2013		2017-2018		2022-2023	
Band (TZS)	**Rate, percent**	**Band (TZS)**	**Rate, percent**	**Band (TZS)**	**Rate, percent**
0-170,000	0 percent	0-170,000	0 percent	0-270,000	0 percent
170,000-360,000	14 percent of the amount over 170,000 TZS	170,000-360,000	9 percent of the amount over 170,000 TZS	270,000-520,000	8 percent of the amount over 270,000 TZS
360,000-540,000	TZS 26,600/ plus 20 percent of the amount over TZS 360,000	360,000-540,000	TZS 20,000/ plus 20 percent of the amount over TZS 360,000	520,000-760,000	TZS 20,000/ plus 20 percent of the amount over TZS 520,000

540,000-720,000	TZS 62,600/=plus 25 percent of the amount over TZS 540,000	540,000-720,000	TZS 53,100/=plus 25 percent of the amount over TZS 540,000	760,000-1,000,000	TZS 68,000/=plus 25 percent of the amount over TZS 760,000
Above 720,000	TZS 107,600/=plus 30 percent of the amount over TZS 720,000	Above 720,000	TZS 98,100/=plus 30 percent of the amount over TZS 720,000	Above 1,000,000	TZS 128,000/=plus 30 percent of the amount over TZS 1,000,000

**Source**: Authors observation based on TRA reports

We observe that:

- Average bottom marginal PAYE rates have fallen from 14 percent to 8 percent in Tanzania between 2012 and 2023, however, remain, on average, higher than those in the African countries. The average top marginal PAYE rate faced by individuals in Tanzania is 30 percent, it's higher than that faced in some African countries.
- PAYE reform is infrequent in Tanzania. Over the period 2012-2023, Tanzania implemented reforms, on average, just once every five and a half years. In Africa, an average of just one in five countries reform rates or bands in any given year[45].

One of the highly debated factors that contribute to the size of the informal sector in African countries is the high employment tax rates. A similar observation applies to Tanzania (Figure 4). One explanation we can provide for this is that workers are willing to work informally with relatively low pay and without any taxes. Moreover, besides leading to a large informal sector, high employment taxes in Tanzania give rise to unfair competition between those businesses that pay these taxes and those that do not. High employment taxes along with limited enforcement led to progressively heavier burdens on those businesses that do pay taxes and eventually cause a strain on the Social Security system.

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[45] ODI working paper

Figure 4. Tax on employment in selected African countries, 2023
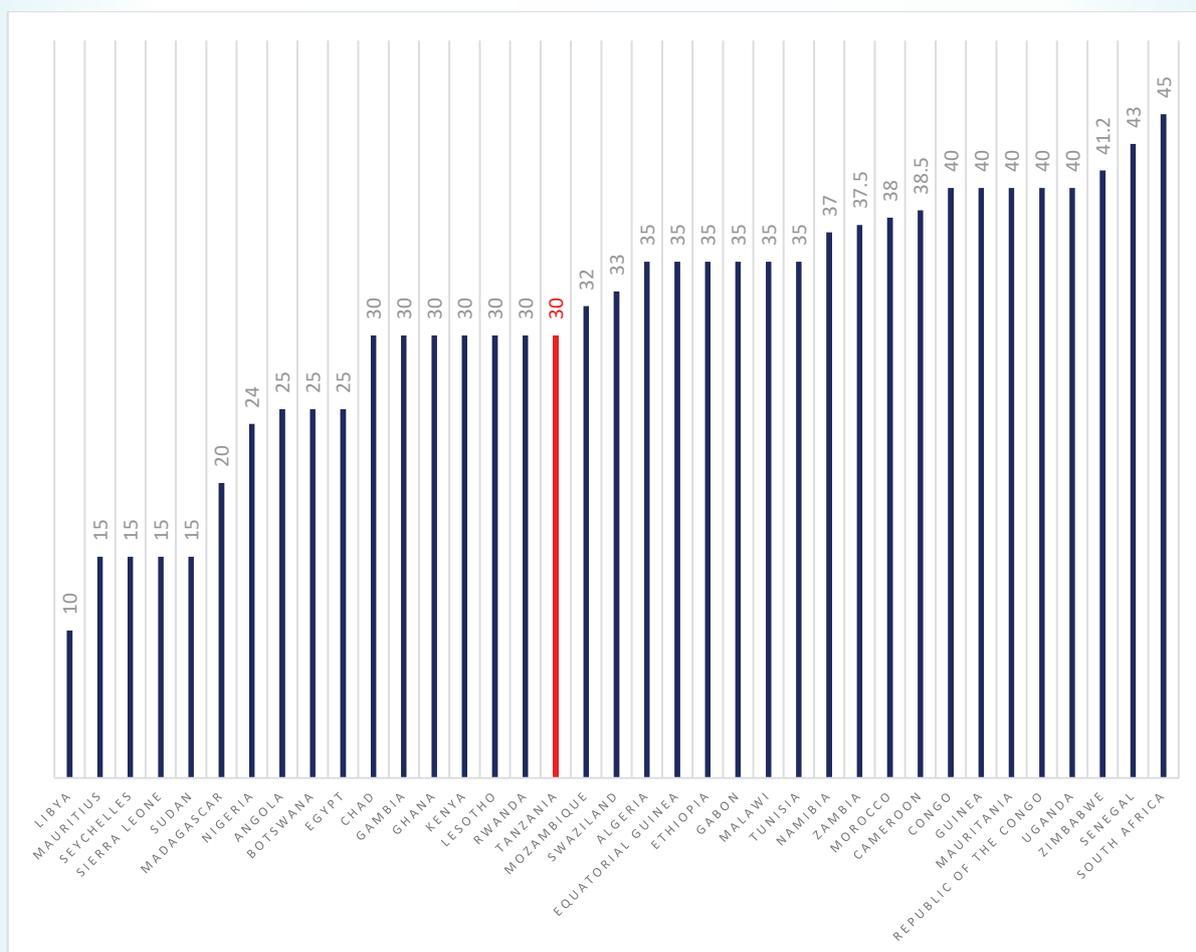
Source: Authors, List of Countries by Personal Income Tax Rate | Africa (tradingeconomics.com)

2.3 Why Government must increase tax revenue and curb informality

Over the past few years, Tanzania has increasingly faced challenges in achieving its desired level of fiscal deficit. Tanzania's budget deficit, including grants, decreased from 4.9 percent of GDP[46] in FY2012/13 to 3.7 percent in FY2022/23. Between 2012/13 and 2022/23, total government expenditures and net lending rose by 2.5-fold while the government's revenue from taxes and non-taxes rose by 3.2-fold. For the estimated period the budget deficit increased by 1.5-fold (Figure 5).

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[46] Calculated on the basis of GDP at current market prices

Figure 5. Trend of Tanzanian's fiscal operation

Legend:
- Total Revenue, including grants
- Total expenditure and net lending
- Fiscal deficit to GDP
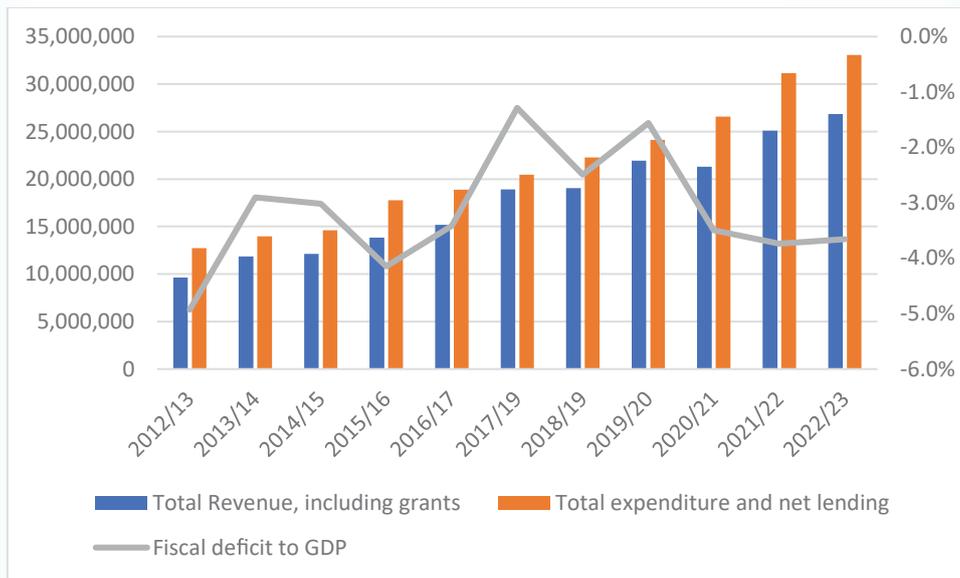
Source: Ministry of Finance and Planning; Bank of Tanzania

Tanzania's government has made progress in containing expenditures, total government spending fell from 20.4 percent of GDP in FY2012/13 to 19.4 percent in FY2022/23, mainly due to the reduction in recurrent expenditure (Figure 6). However, development expenditure to GDP significantly increased from 4.5 percent in FY2014/14 to 7.8 percent in FY 2022/23.

Figure 6. Government expenditure by the main component, in percent to GDP

Legend:
- Recurrent expenditure to GDP
- Development expenditure to GDP
- Total government expenditure to GDP
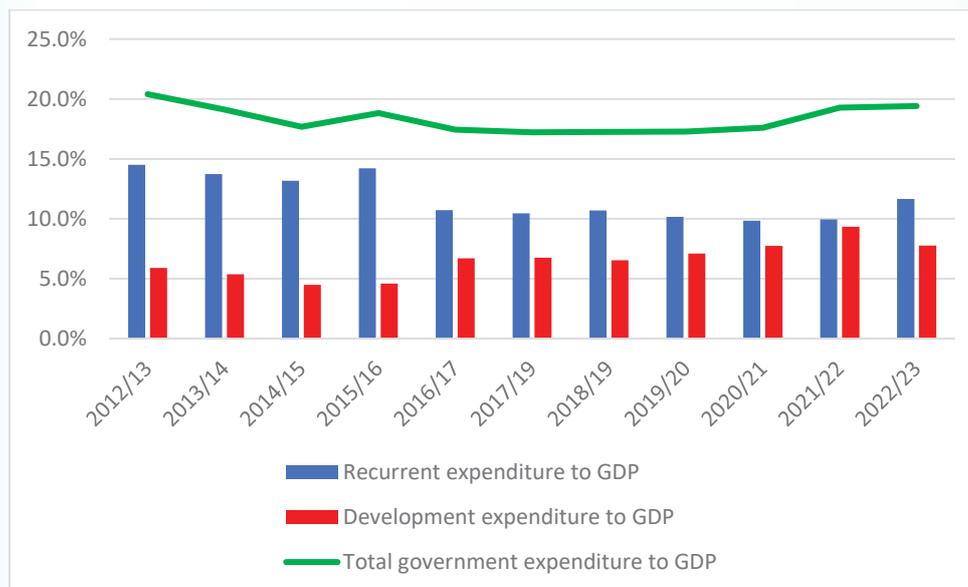
Source: Ministry of Finance and Planning; Bank of Tanzania

In terms of the structure of the recurrent government expenditure, interest payments (domestic and foreign) on total recurrent spending increased significantly from 8.5 percent in FY 2012/13 to 18.6 percent in FY 2022/23 (Figure 6).

Figure 6. Recurrent expenditure by the main component, in percent to the total recurrent expenditure

Source: Ministry of Finance and Planning; Bank of Tanzania

Domestic interest payments rose to 1.5 percent of GDP in FY 2022/23 from 0.9 percent in FY 2012/13; foreign interest payments rose to 0.6 percent of GDP in FY 2022/23 from 0.3 percent in FY 2012/13. Wages and salaries, which represent nearly half of the recurrent expenditure decreased to 5.3 percent of GDP in FY 2022/23 from 6.2 percent in FY 2012/13 (Figure 7).
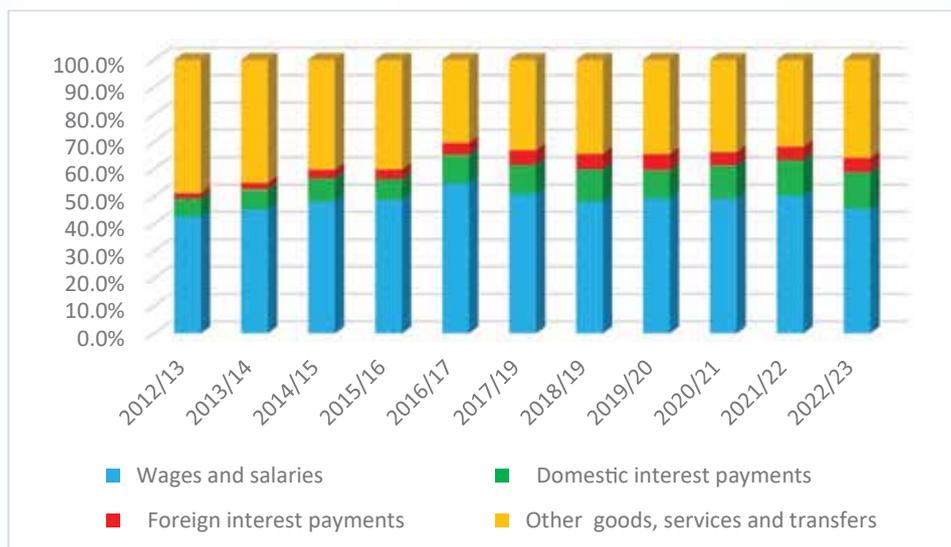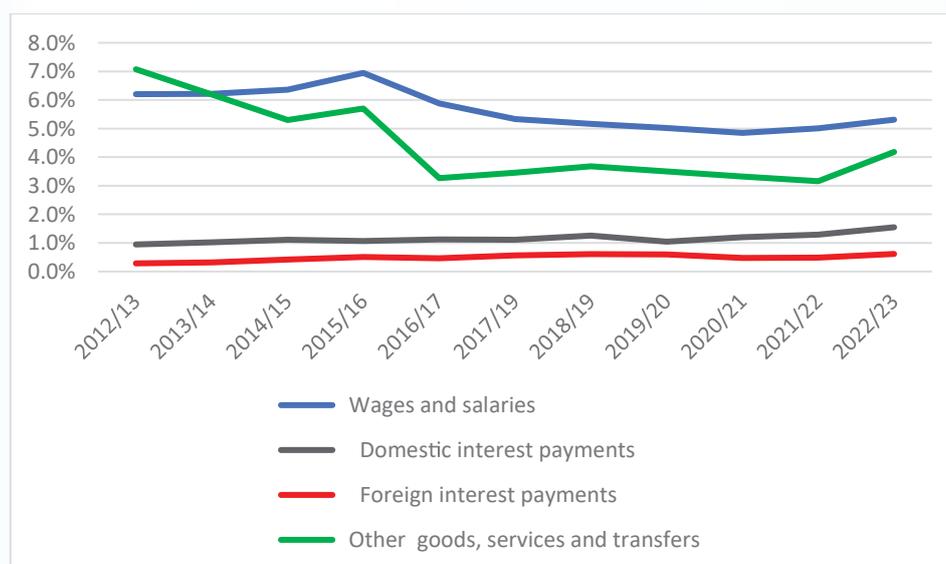
Figure 7. Recurrent expenditure by the main component, in percent to GDP

Source: Ministry of Finance and Planning; Bank of Tanzania

The Government borrows to compensate for the shortfall in domestic revenues and budget support (Figure 8). Between FY 2012/13-2022/23, domestic resources play a major role in financing Tanzania's fiscal deficit, including grants. Domestic borrowing, mainly from bank and non-bank sources, covers 66.4 percent of the fiscal deficit in FY 2022/23. Net foreign financing ranges between 38.1 - 49.2 percent for the estimated fiscal period (FY 2012/13-2022/23). Previously, the fiscal deficit In some years (such as 2012/13, the fiscal deficit was financed almost equally from foreign and domestic sources. Between FY 2012/13 and 2019/20, the fiscal balance was financed mainly from foreign sources. It was then financed equally from foreign and domestic sources until FY 2022/23.

Figure 8. Financing sources to fiscal deficit, in percent
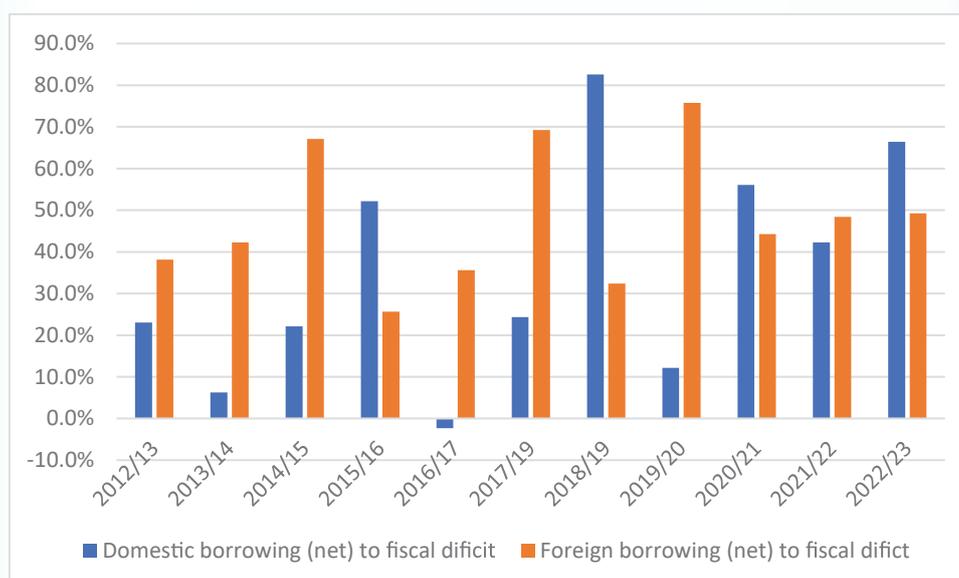
Source: Ministry of Finance and Planning; Bank of Tanzania

Thus, tax revenues could make a vital contribution to the development of Tanzania. But the untapped informal sector, also known as the shadow economy, and inadequate collection of taxes stand in the way.

Despite the fact, that the Tanzanian government has taken effective steps to increase its tax revenue, such as (i) expanding the tax base through electronic payments, (ii) digitalization of the tax system (URT, 2023[47]; WB, 2023[48]), it continues to lose huge amounts of taxpayers' money, especially those who are employed in the informal economy. In 2015, the number of taxpayers registered in Tanzania was only 2.2 million (UDES, 2018[49]). According to the Tanzania Revenue Authority[50], recently, the number

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[47] United Republic of Tanzania, Country Report No. 23/153, April 2023, International Monetary Fund
[48] World Bank (2023). Tanzania Economic Update: The Efficiency and Effectiveness of Fiscal Policy in Tanzania, Issue 19
[49] University of Dar es Salaam (2018). The Nexus between Taxation of the Informal Sector and Inequality in Tanzania. Policy forum. Policy Forum - Report on the Nexus between Taxation of informal sector and inequality in Tanzania INSIDE_Final.pdf (policyforum-tz.org)
[50] Tanzania Revenue Authority - Statistics (tra.go.tz)

of taxpayers registered in Tanzania reached 18.2 million. However, the taxable population in the country is significantly higher. Moreover, many small, independent businesses are not registered - self-employed people often pay neither taxes nor social security contributions. If they were collected, large tax revenues could significantly improve the social service sector (i.e., health and education), expand infrastructure, and contribute to other development projects in Tanzania.

Empirical evidence reveals that Tanzania loses TZS 500 trillion (USD 214 billion)[51] in taxes annually from the informal sector. If the government is interested in getting the informal sector to pay taxes, then it must offer the necessary incentives that would make workers in the informal sector find it of value to pay taxes. This is because the potential for raising more revenue through the application of presumptive taxation methods to bring hard-to-tax groups into the tax net has not yet been fully exploited in Tanzania.

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[51] How Tanzania lost Sh500 trillion in uncollected taxes- study | The Citizen

3. Literature review

3.1 Taxation of the informal sector in practice

According to the International Monetary Fund (2007[52]), more than 39 countries in sub-Saharan Africa and Latin America have introduced special taxation of the informal sector. Indeed, a rapid expansion of the informal sector in developing countries has fuelled governments' interest in including the informal operators, such as firms and workers, in the tax net. Taxing the informal sector broadens the tax base, increases government revenue, and leads to greater control over the quality of jobs provided in the economy (Moyo, B., 2021[53]; Kundt, 2007[54]). Empirical evidence shows that over 50 percent of Sub-Saharan Africa's GDP comes from the informal sector (African Development Bank, 2013[55]), thus, formalizing it would be of great importance in addressing the income and infrastructure challenges faced by African countries.

Among the reasons for the presence of the informal sector in most developing countries are the high administrative and taxation costs to enter the formal sector (Ulyssea, 2020[56]; Levy 2008[57]; Boccanfuso & Savard, 2012[58]; La Porta & Shleifer 2014[59]). These costs include licenses, and multiple institutional permits as is the case in some countries like Tanzania. Other reasons include the presence of involuntary unemployment in the formal labour market and the need to seek additional income (HBS 2017/18).

The transition from the informal sector to the formal sector is said to be constrained by taxation (IMF, 2021[60]). This is an important fact, as it indicates that the informal sector has a vast number of firms, that are productive enough to survive in the formal sector (Levy 2008). However, they prefer to remain informal to receive higher profits due to the cost advantages associated with non-compliance with taxes and

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[52] International Monetary Fund (2007). Taxation of small and medium enterprises, IMF, Washington DC

[53] Moyo, B. (2021). Factors affecting the probability of formalizing informal sector activities in Sub-Saharan Africa: evidence from World Bank enterprise surveys. African Journal of Economic and Management Studies, Vol.13 No. 3. DOI10.1108/AJEMS-06-2021-0304

[54] Kundt, T. (2017). Opportunities and challenges for taxing the informal economy and subnational taxation, K4D Emerging Issues Report, Institute of Development Studies, Brighton, UK.

[55] African Development Bank (2013), Recognizing Africa's Informal Sector, AfDB, Abidjan, available at: https://blogs.afdb.org/afdb-championing-inclusive-growth-across-africa/post/recognizing-africas-informal-sector-11645

[56] Ulyssea, G. (2020). Informality: Causes and Consequences for Development. Annual Review of Economics 2020 12:1, 525-546

[57] Levy S. 2008. Good Intentions, Bad Outcomes: Social Policy, Informality, and Economic Growth in Mexico. Washington, DC: Brook. Inst. Press

[58] Boccanfuso, D., & Savard, L. (2012). A Segmented Labour Supply Model Estimation for the Construction of a CGE Microsimulation Model: An Application to the Philippines. *Margin: The Journal of Applied Economic Research*, 6(2), 211–234. https://doi.org/10.1177/097380101200600206

[59] La Porta R, Shleifer A. (2014). Informality and development. J. Econ. Perspect. 28:109–26

[60] International Monetary Fund (2021). Measuring the informal economy, IMF, Washington DC

administrative regulations (Deléchat et al., 2020[61]). The existence of formal and informal firms competing in the same industry entails different marginal costs (such as labour costs and taxes), which can lead to inefficient resource allocation. Moreover, a large informal sector may result in a higher tax burden for registered workers and firms due to a narrow tax base.

From an empirical perspective, there is less of a consensus on how taxes relate to informality. Several empirical studies associate higher tax rates with a smaller informal sector while others suggest a positive effect of taxes on informality. For example, Joshi (2014), and Ordonez (2014) find that informal taxation has the potential to improve economic growth and broaden tax compliance. They also emphasize on the need to conduct further research on the costs and benefits of informal taxation. Moreover, informal taxation enforcement has been found to reduce the size of the informal sector (Elgin, 2015; Saracoglu, 2008). Nevertheless, the revenue potential of this sector on taxation was found to be low (Memon and Lorenz,2017).

On the other hand, Saracoglu (2008) suggested that the reduction of tax on formal sector employment has the potential to decrease informal employment. In general, the impact of informal taxation on the size and dynamics of informal employment is said to be multifaceted and context dependent.

3.2 Taxation, Informal sector, and CGE modelling

Computable general equilibrium models have been widely used in taxation and informal labour market studies (e.g., see Antón, 2014[62]; Auriol & Warlters, 2012[63]; Fortin et al., 1997[64]; Hernández, 2012[65]). CGE models are appropriate to analyse the interaction between taxation, informality, and labour supply responses because the model captures the structural aspects that determine this interaction. While the model allows the representation of the dual labour market as imperfect substitutes, the simulations show the various channels through which policy changes affect both labour markets and the overall economy. Table 3 presents the main findings of several papers related to this study.

Table 3. Summary of the main findings

Country	Fiscal Reform	Main Findings	Limitations	Authors

[61] Deléchat, C. and Medina, L. (2020). What Is the Informal Economy? Having fewer workers outside the formal economy can support sustainable development https://www.imf.org/en/Publications/fandd/issues/2020/12/what-is-the-informal-economy-basics

[62] Antón, A. (2014). The effect of payroll taxes on employment and wages under high labour informality. IZA Journal of Labour & Development 2014, 3(20), 23.

[63] Auriol, E., & Warlters, M. (2012). The marginal cost of public funds and tax reform in Africa. Journal of Development Economics, 97(1), 58–72. https://doi.org/10.1016/j.jdeveco.2011.01.003

[64] Fortin, B., Marceau, N., & Savard, L. (1997). Taxation, wage controls and the informal sector. Journal of Public Economics, 66(2), 293–312. https://doi.org/10.1016/S0047-2727(97)00013-3

[65] Hernández, G. (2012). Payroll Taxes and The Labour Market: A Computable General Equilibrium Analysis. Latin American Journal of Economics, 49(1).

38 African Countries	All types	The tax base can be extended to cover the informal sector at a relatively low-efficiency cost.	Static CGE model was used thus limiting the analysis of the potential dynamic effects of fiscal reforms	Auriol and Warlters (2012)
Colombia	Payroll taxes (paid by formal firms)	Elimination of payroll taxes increases formal employment through a reduction of informal employment and unemployment.	The study used a static CGE model	Hernández (2012)
Cameroon	Payroll taxes, taxes on profit, and registration fees imposed on formal firms	Higher payroll taxes, taxes on profit, and higher registration fees increase informality, unemployment, and efficiency costs	The model used is static and relatively simple as it does not consider aspects like heterogeneity of the households and ignores capital mobility between firms.	Fortin et al. (1997)
Zambia	Wage subsidy (reduction of payroll tax)	wage-subsidy program targeting women increase their participation in the formal sector	The reform did not specifically target informal workers but employers	Simuchimba et al. (2020)
India	Taxes on imports	Reduction of tariff rates on traded goods expands formal sector growth, hurts informal sector growth especially when sectoral labour mobility is restricted	Implications on the size of the informal sector were not explicitly discussed	Kundu (2020)

Source: Authors' analysis

Modeling of the informality in the CGE models applied to developing countries varies depending on the countries' context. In most studies, informality is explicitly modeled by introducing a dual labour market structure and disaggregating labour into formal and informal labour. Studies also introduce labour migration equations between the two sectors modify the competitive nature of the labour market and introduce the unemployment rate (Fortin et al., 1997; Hernández, 2012).

CGE models have been applied to gauge whether the existing tax rates should be increased or those outside the tax net should be included. For example, Auriol and

Warlters (2012) estimated the marginal cost of public funds (MCF) - changes in the society welfare due to additional units of tax revenue raised by a particular tax using a CGE model applied to 38 African countries. The authors found low MCF estimates which suggest the potential for most African countries including Tanzania to increase total tax revenue with relatively less efficiency cost. Moreover, the low estimates of MCF in the informal economy suggest that it is possible to extend the tax base to include the informal sector and enhance welfare at the same time. However, complementary policies such as investment in infrastructure especially in the rural areas should be put in place to compensate those who lose from expanding the tax base.

There is a wide application of CGE models in analysing the impact of taxation in the formal sector as it involves less administrative costs and has direct consequences on the size of the informal sector employment. For instance, Simuchimba et al. (2020)[66] found that a wage subsidy provided to formal employers targeted at women can potentially increase women's employment in the formal sector and consequently reduce their number in the informal sector. Similarly, Hernández (2012) and Antón (2014) posit that the elimination of payroll taxes reduces firms' labour costs, promotes formal employment, and slightly reduces informal employment and unemployment. Along the same line, higher taxes on firms in the form of payroll taxes, taxes on profits, and registration fees were found to increase informality, unemployment, and efficiency costs (Fortin et al., 1997). These findings are consistent with the presence of scale dualism between formal and informal firms. Higher taxes add to the costs of doing business which force firms to reduce staff levels by investing in technology, scaling their operations, hiring more experienced workers who are more productive, or restructuring their workforce by reducing the number of permanent and increasing the number of temporary workers.

Trade taxes have also been found to relate to the informal economy. Sinha and Adam (2004)[67] showed that a decline in import tariffs increased the wages of informal workers due to the expansion of labour-intensive sectors. However, when wage rigidity

[66]

Simuchimba, B., Chansa, F., Banda, C., Simuchimba, W., & Beyene, L. M. (2020). Can a Wage Subsidy Be Used to Improve Women's Formal Employment in Zambia. Working Paper. Nairobi, Kenya: Partnership for Economic Policy.
[66] Sinha, A., & Adam, C. (2004). Trade Reforms and Informal Economy in India: A CGE Analysis. New Delhi, India: National Council of Applied Economic Research.
[66] Maskaeva, A., Mmasa, J., Lema, N., & Msafiri, M. (2019). Tax Instruments for Tanzania's Industrialization Growth. *The European Proceedings of Social & Behavioural Sciences*, *12*, 10.

[67] A full description of all equations, variables and sets of the CGE model can be found in Decaliwe et al (2013)
[67] Decaluwe, B., Lemelin, A., Robichaud, V., & Maisonnave, H. (2013). PEP-1-t (Single Country, Recursive Dynamic Version). PEP. https://www.pep-net.org/pep-1-t-single-country recursive-dynamic-version
[67] Randriamamonjy J. and Thurlow J. (2017). 2015 Social Accounting Matrix for Tanzania a Nexus Project SAM. Washington, DC: IFPRI
[67] Mabugu, Ramos & Robichaud, Veronique & Maisonnave, Helene & Chitiga, Margaret, 2013. "Impact of fiscal policy in an intertemporal CGE model for South Africa," Economic Modelling, Elsevier, vol. 31(C), pages 775-782

was introduced in the formal labour market, demand for formal labour decreases which also decreases the wage of informal workers. Although the study modeled labour market segmentation by introducing wage dualism, the authors did not show how the transition between the two sectors was modeled and could thus not provide the effect of import tariffs on the size of the informal employment. Accounting for labour mobility between formal and informal sectors in India, Kundu (2020) found that a reduction of tariff rates on traded goods expands formal sector growth but hurts informal sector activities growth particularly when labour mobility is restricted.

Although several studies have been conducted in areas related to fiscal policy in Tanzania (e.g., Maskaeva et al., 2019[68]), no studies have focused on the impacts of taxation policies on labour market informality, particularly using the CGE model. With the rising governments' interest in including the informal workers in the tax net, this study is set to provide evidence on the economy-wide effects of taxation on this sector and the consequent distributional effects. Moreover, the study presents the effects of taxation on labour supply responses of both formal and informal workers following changes in the tax rates, the issues that are of central importance to tax policies design.

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[68] A full description of all equations, variables and sets of the CGE model can be found in Decaliwe et al (2013)

[68] Decaluwe, B., Lemelin, A., Robichaud, V., & Maisonnave, H. (2013). PEP-1-t (Single Country, Recursive Dynamic Version). PEP. https://www.pep-net.org/pep-1-t-single-country recursive-dynamic-version

[68] Randriamamonjy J. and Thurlow J. (2017). 2015 Social Accounting Matrix for Tanzania a Nexus Project SAM. Washington, DC: IFPRI

4. Methodology and data

4.1 Macro simulation approach

This study uses a single-country dynamic recursive CGE model Partnership for Economic Policy (PEP) 1-t[69] developed by Decaluwé et al. (2013)[70]. The model is calibrated using the 2022 Tanzanian Social Accounting Matrix (SAM) updated from an initial 2015 Tanzanian SAM, developed by the International Food Policy Research Institute (IFPRI) researchers (Randriamamonjy and Thurlow 2017)[71]. The PEP CGE model's equations include some modifications to make it relevant to the Tanzanian economy and study objectives.

A dynamic model can give a better picture of how the impacts of policy changes evolve. Compared to a static CGE model, a dynamic model allows for the analysis of both the short-run transitional, and the long-run dynamic effects of the tax policy shocks in the economy (Mabugu et al., 2013[72]). For instance, changes in income taxes involve intertemporal distortions as may result in the households' reallocation of income between consumption and savings and therefore affect the future levels of investment and production. These impacts of income taxes can well be accounted for in a dynamic multi-period CGE model, similar to the one used in this study. The dynamics introduced enhance the validity of the model results by capturing the behavioural responses of economic agents and time lags. However, the sensitivity analysis to test the robustness, and reliability of the results should be conducted to examine how sensitive the results are to changes in the key parameters and assumptions of the model. Thus, section 5.7 provides a sensitivity analysis for key parameters of the model.

Our model differentiates four representative agents (households, firms, government, and the rest of the world), 17 production activities, 17 commodities, four types of labour categories disaggregated by formal/informality nature and skills, and two capital categories, including land (formal and informal). The data is described in detail in the next section.

On the supply side, we structure our model according to a 4-level production process. As in the base PEP model, at the top level, and for each activity, production is

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[69] A full description of all equations, variables and sets of the CGE model can be found in Decaliwe et al (2013)

[70] Decaluwe, B., Lemelin, A., Robichaud, V., & Maisonnave, H. (2013). PEP-1-t (Single Country, Recursive Dynamic Version). PEP. https://www.pep-net.org/pep-1-t-single-country recursive-dynamic-version

[71] Randriamamonjy J. and Thurlow J. (2017). 2015 Social Accounting Matrix for Tanzania a Nexus Project SAM. Washington, DC: IFPRI

[72] Mabugu, Ramos & Robichaud, Veronique & Maisonnave, Helene & Chitiga, Margaret, 2013. "Impact of fiscal policy in an intertemporal CGE model for South Africa," Economic Modelling, Elsevier, vol. 31(C), pages 775-782

represented by a Leontief input-output function[73] (fixed coefficient). This means that there is perfect complementarity between aggregated value-added and intermediate inputs, without any possibility of substitution. At the second level, aggregated value-added combines value added for formal and informal sectors according to a constant elasticity of substitution (CES)[74] technology. At the third level, the value added of formal and informal sectors consists of the composite labour and capital, following a CES specification. At the fourth level, the aggregate formal and aggregate informal labour are modeled following a CES specification with substitution possibilities among different skills groups.

On the demand side, consumers face imperfect substitutability between the demand for domestic goods and imports following the Armington specification. Regarding the income, agents receive income from their endowment of the factors of production and use this income to pay taxes, make transfers, consume goods and services, and make savings for investment purposes.

The elasticity of substitution between categories of aggregate formal labour is less compared to the elasticity of substitution between different categories of aggregate informal labour. This is because, it is relatively easy to substitute workers in the informal sector compared to the formal sector due to different levels of skills required, experience, and so on. To implement the CGE model we use income elasticity from (Chongela et al. 2014[75]) and trade elasticities from (World Bank, 2023[76]).

Mathematically, the following equations in the PEP 1-t CGE model are modified to consider the dual labour market (formal and informal) in the economy.

$$VA_{j,t} = B_j^{VA} \left[\beta_j^{VA} VAF_{j,t}^{-\rho_j^{VA}} + (1 - \beta_j^{VA}) VAI_{j,t}^{-\rho_j^{VA}} \right]^{\frac{-1}{\rho_j^{VA}}} \tag{1}$$

Where; $VA_{j,t}$ Value added of industry j; $VAF_{j,t}$ Value added of the formal sector j; $VAI_{j,t}$ Value added of the informal sector j

Value added of the formal sector and the informal sector are then modeled as CES of respective capital and labour demand in equations (2) and (3)

$$VAF_{j,t} = B_j^{VAF} \left[\beta_j^{VAF} LDCF_{j,t}^{-\rho_j^{VAF}} + (1 - \beta_j^{VAF}) KDCF_{j,t}^{-\rho_j^{VAF}} \right]^{\frac{-1}{\rho_j^{VAF}}} \tag{2}$$

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[73] Leontief input-output function is a production function named after the Russian-American economist Wassily Leontief, which assumes that the level of production is determined by a fixed proportion of inputs say labour and capital.

[74] Constant elasticity of substitution function describes how inputs (such as labour and capital) are combined to produce an output in the economy such that the rate at which one factor can be substituted for another remain the same at all levels of the production process.

[75] Chongela, J., Nandala, V., and Korabandi, S. (2014). Consumer demand system of agri-food in Tanzania. Journal of Development and Agricultural Economics, Vol. 6(1). DOI:10.5897/JDAE2013.0475

[76] Devarajan, Sh., Delfin S. Go, D., and Robinson, Sh. (2023). Trade Elasticities in Aggregate Models: Estimates for 191 Countries. Policy Research Working Paper 10490. World Bank

Where; $LDCF_{j,t}$ = Composite demand of the formal labour; $KDCF_{j,t}$ = Composite demand of the formal capital

$$VAI_{j,t} = B_j^{VAI} \left[\beta_j^{VAI} LDCI_{j,t}^{-\rho_j^{VAI}} + (1 - \beta_j^{VAI}) KDCI_{j,t}^{-\rho_j^{VAI}} \right]^{\frac{-1}{\rho_j^{VAI}}} \tag{3}$$

Where; $LDCI_{j,t}$ = Composite demand of informal labour; $KDCI_{j,t}$ = Composite demand of informal capital.

The main dynamic specification of accumulation of capital stock is determined for each period considering the depreciation rate and the additional stock of capital. The model variables and parameters are expected to grow at the same rate consistent with the average population growth rate of Tanzania of 3 percent (NBS, 2023[77]).

4.1.1 Modeling of the Labour Supply

Tax policies play a significant role in individual labour supply decisions. A person may choose whether to work as a formal worker, informal worker, or not work and prefer leisure depending on the maximum utility derived from his or her choice. The decision whether to participate in the labour market or not to work and choose leisure is dictated by labour remuneration. Therefore, a tax imposed on labour income may have either income or substitution effect depending on whether it increases or reduces labour supply in favour or against leisure (Lemelin & Savard, 2022[78]). An increase in the wage rate has a substitution effect if it raises the opportunity cost of leisure and induces a person to work more and reduce leisure. On the other hand, an increase in the wage rate has an income effect when it increases the real income which incites an increase in consumption of all normal goods including leisure. The net effect on the labour supply thus is an empirical issue which depends on the dominating effect as determined by the wage rate elasticity (or income elasticity) of household labour supply.

In some cases, wage rate changes induced by taxation (in the formal sector) may cause a shift of the labour supply into the underground or informal economy (Fortin et al., 1996[79]). However, an individual may prefer to work as an informal worker due to flexibility advantages such as flexibility in working premises, flexibility in hours of work, and distance to the workplace.

To represent a worker's choice to participate in the labour market, we follow the methodology of Annabi (2003) and assume that leisure is a normal good with an opportunity cost equal to the wage rate. We introduce the consumption of leisure into

[77] National Bureau of Statistics - Population Projections for the Period of 2013 to 2035 at National Level (nbs.go.tz)

[78] Lemelin, A., & Savard, L. (2022). What do CGE models have to say about fiscal reform? *Economic Analysis and Policy*, *74*, 758–774. https://doi.org/10.1016/j.eap.2022.04.003

[79] Fortin, B., Marceau, N., & Savard, L. (1997). Taxation, wage controls and the informal sector. Journal of Public Economics, 66(2), 293–312. https://doi.org/10.1016/S0047-2727(97)00013-3

the utility function and determine the demand functions for aggregate goods and leisure. The demand for leisure is then used to derive the labour supply function of each household.

We use a nested consumption function where, at the first level each representative household h is said to choose between two types of goods; aggregate consumption good or market good produced by economic activities $((Ch,i,t)$ and the leisure time $L_{l,h,t}$ of active members according to a linear expenditure system (LES). At the second level, the aggregate consumption is a Stone-Geary utility function of different consumption goods subject to the budget constraint. The demand function of goods and the household labour supply are thus given by equations (4) and (5) respectively.

$$PC_{i,t}C_{i,h,t} = PC_{i,t}C_{i,h,t}^{MIN} + \frac{\gamma_{i,h}^{LES}}{1-\sum_l \varphi_{l,h}}\left(CTH_h - \sum_{ij} PC_{ij}C_{ij,h}^{MIN}\right) \qquad (4)$$

$$LS_{l,h,t} = MAXHOURS_{l,h,t} - \frac{\varphi_{l,h}}{(1-\varphi_{l,h})W_{l,t}}\left\{CTH_h - \sum_{ij} PC_{ij}C_{ij,h}^{MIN}\right\} \qquad (5)$$

Where; $PC_{i,t}$ = Purchaser price of composite commodity i (including all taxes and margins), $C_{i,h,t}$ = Consumption of commodity i by type h household, CTH_h = total consumption budget of household h, $C_{ij,h}^{MIN}$ = Minimum consumption of commodity i by type h households, $\varphi_{l,h}$= Share of leisure consumption, $\gamma_{i,h}^{LES}$ = Marginal share of commodity i in type h household consumption budget, $LS_{l,h,t}$ = Household supply of type l labour, $MAXHOURS_{l,h,t}$ = Maximal time per worker, $W_{l,t}$= Wage rate of type l labour

The labour supply is no longer fixed but determined endogenously. At the equilibrium, the total labour supply in each segment of the labour market equals the sum of the household labour supply.

$$LST_{l,t} = \sum_h LS_{l,h,t} \qquad (6)$$

Where; $LST_{l,t}$ = Total supply of type l labour

To characterize the imperfect substitutability between formal and informal employment following the changes in the relative wage rates, the constant elasticity of transformation (CET)[80] function is used. The income elasticity of household labour supply used in this study is low (0.12) consistent with estimates from econometric studies conducted in other developing countries with a large informal sector similar to

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[80] Constant elasticity of transformation (CET) is a function used to describe the extent to which inputs (such as labour and capital) can be transformed or converted to one another in production. When the value of elasticity of transformation is 1, then inputs are perfectly substitutable, when it is 0 then they are not substitutable, when it is infinity then there is fixed shares of inputs and they cannot be substituted.

Tanzania. Rochjadi and Leuthold (1994)[81] found the value of income elasticity of labour supply in Indonesia in the range of 0.33- 0.58 while Goldberg (2016)[82] found a value of 0.15 for Malawi. In a CGE application for 38 African countries, Auriol and Warlters (2012) used the low elasticity of zero and applied the values of 0.05 and 1 for sensitivity analysis. Therefore, a relatively small value used in this study is considered appropriate to avoid overestimation of the results.

4.1.2 Macro closure rules

In terms of closure rules, our CGE model specifies the equilibrating mechanisms for three macroeconomic variables: government expenditure, savings-investment, and the balance of payments. We fix the government expenditure, investment, and the current account balance. Therefore, when tax revenue increases, there is a government budget surplus. As investment is fixed, household consumption increases (as their savings fall) by the amount of tax revenue.

Regarding world trade, we assume that world prices are fixed, as we consider Tanzania to be a small, price-taker country. Depending on variations in the foreign savings account, the real exchange rate is flexible - it could appreciate or depreciate, and the nominal exchange rate is the numeraire. Further, we assume that capital is fully employed and sector-specific while labour is mobile across sectors. The labour supply is endogenous, and it can change in response to policy shocks. Labour demand, employment, and wages can vary after a shock, but wage differentials are fixed at their initial level.

4.2 Microsimulation approach

This study assesses the distributive impacts of tax policy options in Tanzania mainland, using a top-down micro-simulation approach following Tiberti, et al., 2017[83]. This is a layered approach similar to a bottom-up or iterative top-down/bottom-up approach where two models are connected sequentially (Figure 9). In the first stage, the simulations are conducted in a CGE model where the macro and sectoral level effects of policy shocks are estimated. In the second stage, a separate behavioural microsimulation model is implemented, after the results of the changes in the prices, wages and employment levels are passed from the CGE model. These changes are then

[81] Rochjadi, A., & Leuthold, J. H. (1994). The Effect of Taxation on Labour Supply in a Developing Country: Evidence from Cross-Sectional Data. Economic Development and Cultural Change, 42(2), 333–350. https://doi.org/10.1086/452083[81] Goldberg, J. (2016). Kwacha Gonna Do? Experimental Evidence about Labour Supply in Rural Malawi. American Economic Journal: Applied Economics, 8(1), 129–149. https://doi.org/10.1257/app.20130369

[81] Tiberti, L., Cicowiez, M., and Cockburn, J. (2017). A Top-Down Behaviour (TDB): Microsimulation Toolkit for Distributive Analysis. Partnership for Economic Policy. Québec City, Canada: Université Laval/PEP. Available at https://www.pepnet.org/microsimulation-distributive-analysis

used in a microsimulation model to estimate the policy impacts on poverty and inequality following changes in employment status, household income, and consumption. Macro-level results are integrated into a micro-simulation module using the 2017/2018 Household Budget Survey dataset for Tanzania. The dataset is collected at the microeconomic agents' level (individuals and households).

Contrary to other micro-simulation approaches like a representative household model and a fully integrated approach, the top-down approach used in this study can predict labour market behaviour based on individual or household characteristics using econometric estimations. In this model, the workers are either wage workers (formal), self-employed (mostly informal) or not working. Moreover, workers are disaggregated by skill level depending on the highest level of education attained. The advantage of using the behavioural top-down approach is that the model allows for the adjustment of individuals' behaviour in response to policy shocks. This way individual heterogeneity regarding the effects of, and reaction to the shocks is fully considered, leading to unbiased poverty and distributive effects[84]. However, one of the main limitations of this microsimulation approach is the inability to capture the feedback effect from the micro-to-macro model (Tiberti et al.,2017[85]).

Figure 9. Integration of CGE and microsimulation
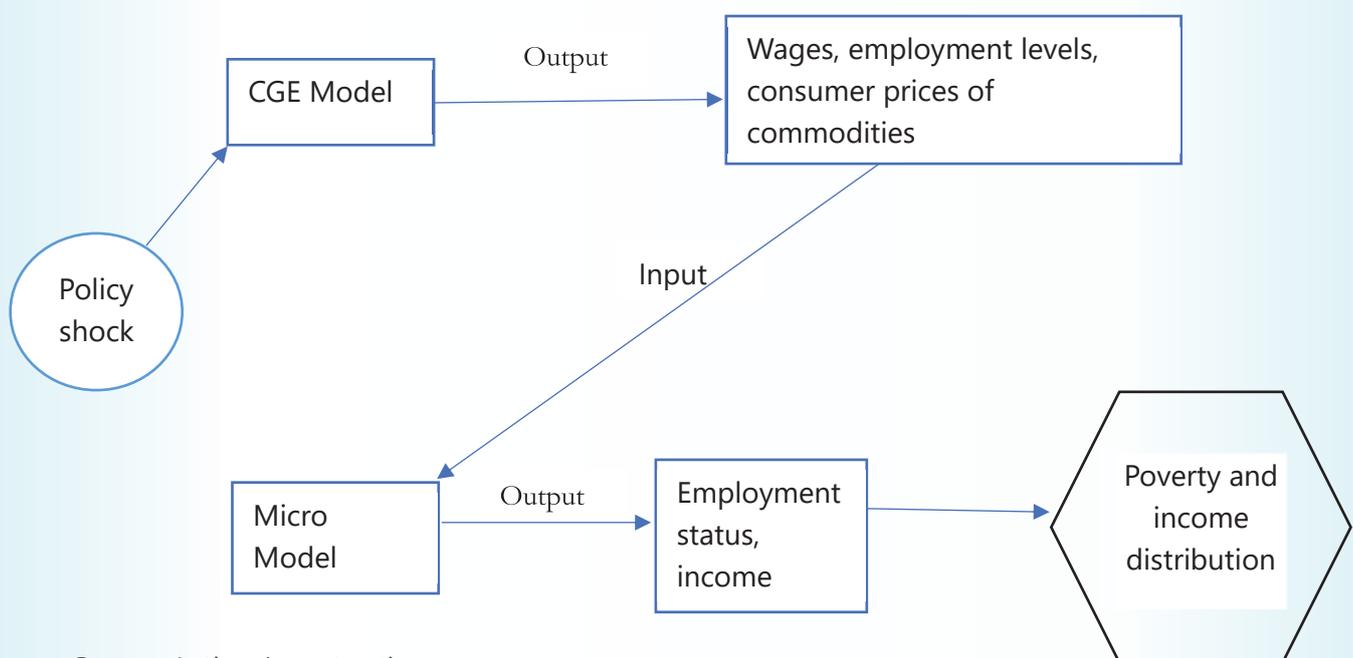
Source: Authors' construction

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[84] Cockburn, J., L. Savard and L. Tiberti (2014) "Macro-Micro Models" by in C. O'Donoghue (ed.) Handbook of Microsimulation Modelling (Contributions to Economic Analysis, Volume 293) Emerald Group Publishing Limited, pp.275 – 304

[85] Tiberti, L., Cicowiez, M., and Cockburn, J. (2017). A Top-Down Behaviour (TDB): Microsimulation Toolkit for Distributive Analysis. Partnership for Economic Policy. Québec City, Canada: Université Laval/PEP. Available at https://www.pepnet.org/microsimulation-distributive-analysis

As in Tiberti et al. (2017), a multinomial logit model is used to estimate the individual labour supply, with the choice among three occupation alternatives determined by a set of individual and household characteristics. Then the mobility of individuals between occupations is determined based on their probability of being in that occupation category. After determining the occupational choice, household income is then calculated. The variations in household incomes are then combined with the changes in consumer prices to derive changes in real consumption.

To estimate the impact of tax policy shocks, the model uses the standard poverty gap indices which are Foster-Greer-Thorbecke (FGT) Index (Foster et al, 1984) and the Gini inequality index to measure the impact on poverty and inequality respectively. The indices are then compared between simulation scenarios to analyse the variations due to policy shocks. The FGT index is introduced in the equation (7).

$$P_\theta^t(x) = \frac{1}{N}\sum_{h=1}^{H}\beta_{h,c}n_{h,c}\left(\frac{x - e_{h,c}^t(p^0, p_c^t, y_{h,c}^t)}{x}\right)_+^\theta,$$

where x is the monthly poverty line in the base year; $f_+ = \max(0, f)$; N is the number of households in the survey; $n_{h,c}$ is the size of household h in cluster c; $\beta_{h,c}$ is the sampling weight of household h in time t; θ is the poverty aversion parameter.

In the results, both the poverty rate (FGT0) and poverty gap (FGT1) are presented. The poverty rate measures the proportion of the people who fall below the poverty line, indicating the incidence of poverty. Further, the poverty gap measures the proportion by which the average income of poor households falls below the poverty line, indicating the depth of the poverty.

4.3 Data

The study uses the 2015 Tanzanian SAM that was built by International Food Policy Research Institute researcher (Randriamamonjy and Thurlow 2017)[86].). The original 2015 Tanzanian SAM has the following accounts: (i) 68 accounts of production activities, (ii) 70 accounts for commodities, (iii) three factors of production divided into land, capital and labour (labour is further disaggregated into three categories based on education), (iv) ten household categories disaggregated into rural and urban and by per capita consumption quantiles, (v) three other agents, firms, government and the rest of the world and, (vi) savings – investment account. For this study, several modifications have been made to the original 2015 SAM. First, using the social accounting matrix balance (SAMBAL) method by Lemelin et al (2013)[87], the 2015 SAM

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[86] Randriamamonjy J. and Thurlow J. (2017). 2015 Social Accounting Matrix for Tanzania a Nexus Project SAM. Washington, DC: IFPRI
[87] Lemelin, A, Fofana, I and Cockburn, J (2013) Balancing a Social Accounting Matrix: Theory and Application, available of the PEP website (https://www.pep-net.org/sambal-gpcema)

for Tanzania was updated to 2022. Updating the SAM is based on historical fiscal and macroeconomic indicators for Tanzania obtained from different sources (Table 4).

Table 4. Macroeconomic indicators

Indicators	SAM for Tanzania	
	2015	**2022**
GDP at market prices, bln TZS	**85 816**	**170 263**
Share of final private expenditure in GDP	0.61	0.61
Share of Government consumption in GDP	0.14	0.07
Share of Exports in GDP	0.22	0.17
Share of Imports in GDP	0.27	0.26
GDP at basic prices, bln TZS	**78 716**	**157 518**
Agricultural activity in proportion of GDP at basic prices	0.29	0.28
Manufacturing activity in proportion of GDP at basic prices	0.27	0.33
Services activity in proportion of GDP at basic prices	0.44	0.38
Tax revenue, bln TZS	**10 878**	**21 720**

Source: author's calculations based on the 2015 Tanzanian SAM (Randriamamonjy & Thurlow, 2017); National Accounts Statistics (NBS, 2023); Bank of Tanzania (BOT, 2023)

Second, the 68 branches of production were grouped into 17, notably to have correspondence with the Integrated Labour Force Surveys for Tanzania (ILFS, 2015; ILFS, 2020) and Household Budget Surveys (HBS, 2012; HBS, 2020) data. The current matrix includes 17 activities and 17 products.

Third, to introduce informality in the Tanzanian labour market, the labour account is split into the formal and informal labour markets. Then, each labour market is disaggregated into two skilled labour categories (skilled and unskilled) according to the educational level (i.e., never attended, pre-primary, primary, secondary, and tertiary).

According to the HBS, the aggregated capital account, namely agricultural capital is split between formal and informal. It should be noted that the official information about how the capital is allocated between formal and informal sectors is very limited. We assumed, that the capital share in value added is smaller for the informal sector than it is for the formal sector. The composition of value added in Tanzania is shown in Table 5.

Table 5. Contribution of production factors (formal and informal) by activity to the value-added, by percent

Activity	Formal labour	Informal labour	Formal capital, including land	Informal capital	Total
Agriculture	0.9	40.3	54.6	4.1	100
Mining	5.2	17.3	77.5	0	100
Manufacturing	6.1	11.9	82.0	0	100
Electricity and gas	53.1	3.3	43.5	0	100
Water	37.9	7.3	54.7	0	100
Construction	30.9	43.2	25.9	0	100
Trade	12.1	50.9	36.9	0	100
Transport	20.7	20.8	58.4	0	100
Accommodation and food catering	9.7	44.2	46.1	0	100
Communication	22.1	1.8	76.1	0	100
Financial services	34.5	5.1	60.4	0	100
Real estate	1.3	6.3	92.4	0	100
Business services	66.8	27.6	5.6	0	100
Public administration	94.8	1.8	3.4	0	100
Education	87.2	10.0	2.8	0	100
Health	66.8	30.4	2.8	0	100
Other services	15.7	54.1	30.2	0	100
Total	**20.6**	**31.8**	**46.5**	**1.2**	**100**

Source: Authors' calculation based on 2022 updated Tanzania SAM (Randriamamonjy J. and Thurlow J., 2017)

The activities with the highest percentage contribution of informal labour are agriculture (40.3 percent), trade (50.9 percent), accommodation and food catering (44.2 percent), and other services (54.1 percent). Indeed, a large part of the employment created in the services is self-employed in the low-wage informal sector such as household enterprises in the trade, hotels, and restaurants sector (ILFS, 2021). These sectors exist with well-paid jobs in the formal services sector (such as financial, communication, and business sectors), leading to increased inequality within the

service sector in terms of labour income. This observation is consistent with Sen, 2023[88].

Finally, following the methodology (Rada, 2009[89]; Marrone, 2012[90]; Santos, 2014[91]) household sector is divided into formal and informal households based on their sources of income. Particularly, we call a household informal if one of the income earners in that household is engaged in the informal sector. Indeed, the informal sector includes the self-employed, unpaid workers, and those informally employed (Adams et al., 2013[92]). Based on the 2019 HBS, more than 32 percent of households in Tanzania have at least one self-employed individual in that household. The total number of observed households was 9,464. Table 6 provides household income by five sources: wages (formal and informal labour incomes), returns to capital (formal and informal capital income), transfers from the government, dividends (firms), and foreign transfers (remittances).

Table 6. Income sources by household category: formal and informal households (in percent)

	Formal labour income	Informal labour income	Formal capital income	Informal capital income	Government transfers	Firm's dividends	Remittances from ROW
Formal households	10.51	16.23	5.19	0.38	1.28	18.35	4.70
Informal households	8.43	13.01	8.31	0.70	1.46	9.11	2.33

Source: Authors' calculation based on 2022 updated Tanzania SAM (Randriamamonjy J. and Thurlow J., 2017)

Based on income distribution (Table 6) informal household's share of income comes up to 43.4 percent of the total income of the household sector. This estimate considers

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[88] Sen, K. (2023) Varieties of Structural Transformation: Patterns, Determinants, and Consequences Cambridge: Cambridge University Press. Elements in Development Economics

[89] Rada, C. (2009). Formal and Informal Sectors in China and India: An Accounting-Based Approach. Working Paper No: 2009-02

[89] Morrone, H. (2012). Formal and informal sectors in a Social Accounting Matrix for Brazil, Working Paper, No. 2012-09, The University of Utah, Department of Economics, Salt Lake City, UT

[90] Santos, S. (2014). Studying the informal aspects of the activity of countries with Social Accounting and Socio-Demographic Matrices. Working Paper No. 17 /2014/DE (Department of Economics)/UECE (Research Unit on Complexity and Economics) – ISEG (School of Economics and Management) / University of Lisboa

[91] Adams, Arvil V., da Silva, Sara Johansson, and Razmara, Setareh (2013). Skills Development in the Informal Sector: Tanzania. In the World Bank book: Improving Skills Development in the Informal Sector: Strategies for Sub-Saharan Africa. July 2013, 239-268

not the actual numbers of workers in the formal and informal activities but the actual income of households.

In terms of total household expenditure (Figure 10), informal households spend 89.2 percent on final goods. In addition, they pay 0.7 percent of their total income in transfers and income taxes to the Government and save only 9.9 percent. Formal households consume final goods (86.8 percent) as well, pay 6.6 percent in taxes, and save 6.6 percent. Transfers from both categories of households to the ROW are too small.

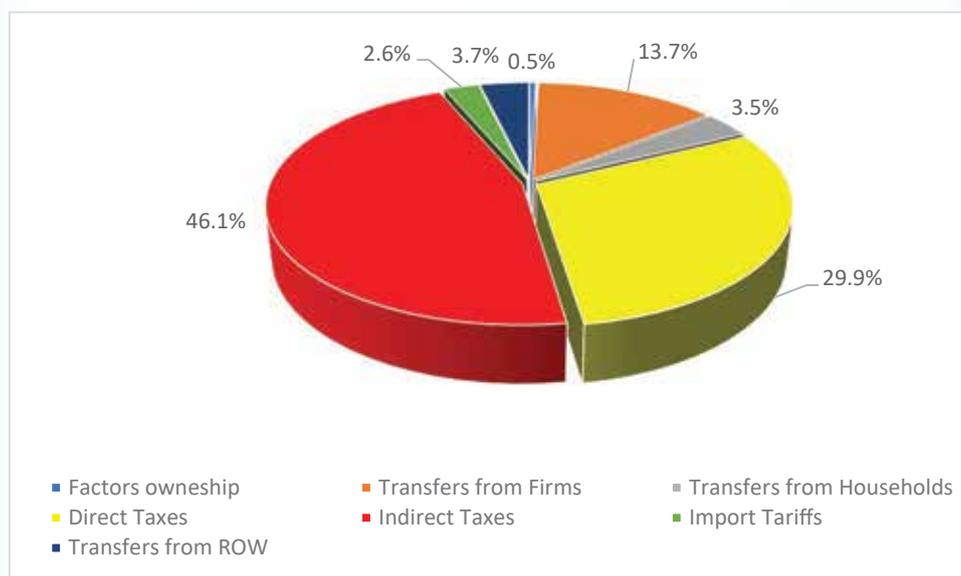*Figure 10. Households' consumption and expenditure by household category: formal and informal households (in percent)*
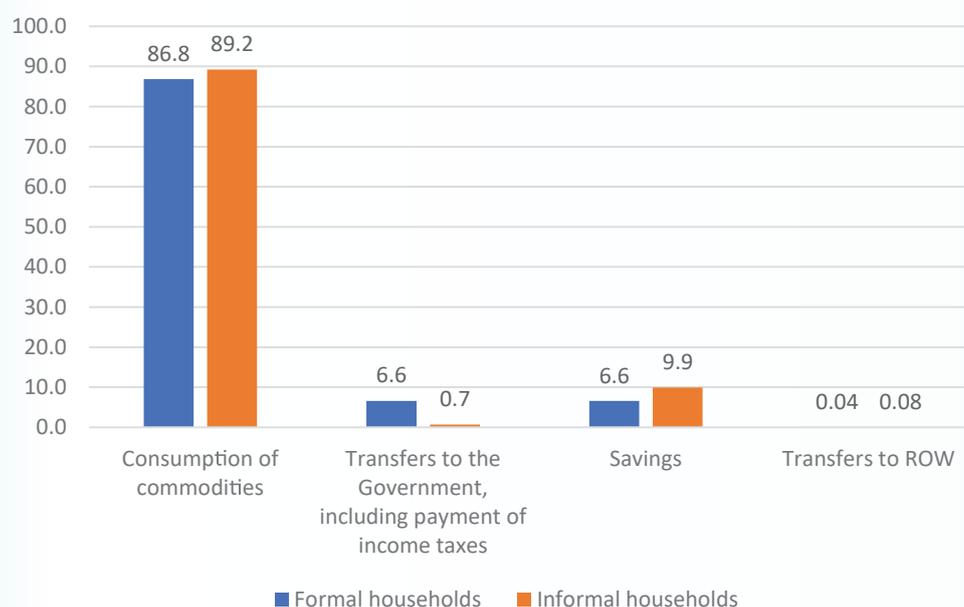
Source: Authors' calculation based on 2022 updated Tanzania SAM (Randriamamonjy J. and Thurlow J., 2017)

Firms' income is based on transfers from the Government (23.3 percent), the rest of the world (4.2 percent), and mainly on formal capital income (72.5 percent). Firms spend 73.4 percent of their total income on dividends to households, 18.3 percent on taxes, and saving 8.3 percent.

The Government's income consists of direct taxes from households and firms and indirect taxes (import duties, taxes on commodities), and transfers from the rest of the world (Figure 11). Most of the government income comes from indirect taxes (46.1 percent), which are VAT taxes and excise duties. Direct tax income (personal income taxes and corporate taxes) contributes 29.9 percent of the total revenue, while import tariffs contribute 2.6 percent, and transfers from the ROW contribute 3.7 percent. Household's and firm's transfers to the government account for 3.5 percent and 13.7 percent.
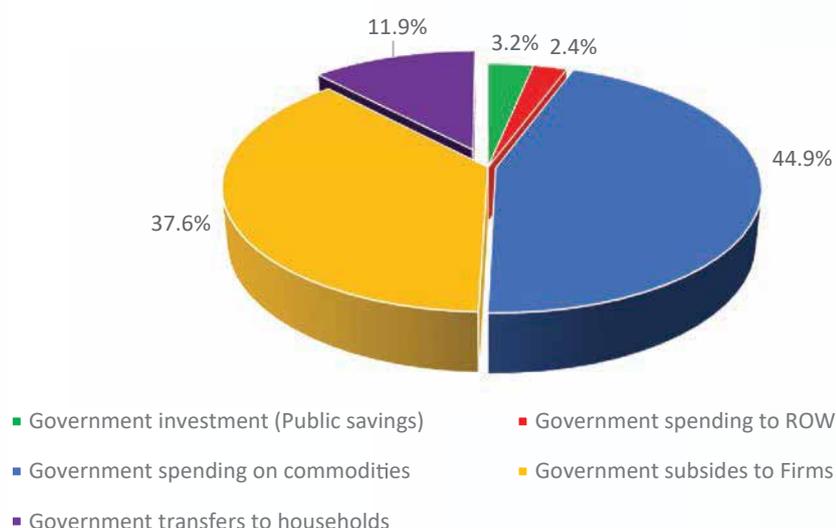
Figure 11. Structure of government revenue (in percent)

2.6% 3.7% 0.5% 13.7%

3.5%

46.1%

29.9%

- Factors owneship
- Transfers from Firms
- Transfers from Households
- Direct Taxes
- Indirect Taxes
- Import Tariffs
- Transfers from ROW

Source: Authors' calculation based on 2022 updated Tanzania SAM (Randriamamonjy J. and Thurlow J., 2017)

The government spends 44.9 percent of its income on purchases of commodities (i.e., public administration, education, and health), 11.9 percent on transfers to households, 37.6 percent on transfers to firms (subsidies), and 2.4 percent on payments abroad. The remained government income constitutes savings of 3.2 percent (Figure 12).

Figure 12. Structure of government expenditure (in percent)

11.9% 3.2% 2.4%

44.9%

37.6%

- Government investment (Public savings)
- Government spending to ROW
- Government spending on commodities
- Government subsides to Firms
- Government transfers to households

Source Authors' calculation based on 2022 updated Tanzania SAM (Randriamamonjy J. and Thurlow J., 2017)

4.4 Simulation scenarios

This study simulates and compares three policy scenarios which are based on official data, so we are not exposing our assumptions to estimates (Table 7). Furthermore, we compare the simulation results (e.g., the change in GDP, labour supply and wages in the formal and informal sectors, government revenue, households' income and consumption) with the available statistical information. We also run a couple of sensitivity analyses[93] to see the extent of results variation due to changes in key parameter values.

Simulation 1. An adjustment in the Personal Income Tax (PIT) rate structure (SIM1). This policy involves an increase in the tax rate applied to the total income received by informal households. We introduce a flat tax rate of TZS 20,000 per year. Tanzania's tax system is progressive, but the tax net is very limited. The PIT, which is based on a graduated rate structure, is very progressive, and revenue is collected exclusively from households who are engaged in the formal sector of the economy (see section about SAM), who tend to be better off than their informal counterparts. Increasing attention to the taxation of the informal economy is grounded in its potential importance to government revenue, economic growth, and governance (Schneider et al., 2010[94]; Joshi et al., 2014[95]; Hammond et al., 2023[96]). In practice, however, the direct revenue benefits of taxing the informal households are likely to be relatively modest due to low-income base (Keen, 2012[97]; Joshi et al., 2014[98]), and the implications for vertical equity[99] are potentially unfavourable (Pimhidzai and Fox, 2012[100]). Fiscality can therefore be deemed as a measure to balance inequality gaps and their influences on extremely vital disadvantaged households.

The main purpose of this simulation (SIM1) is to evaluate the effects of increasing the PIT rate on the economic behaviour of households, especially informal ones, as well as

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[93] Sensitivity analysis offers a kind of validation.

[94] Schneider, F., Buehn, A., & Montenegro, C. (2010). Shadow economies all over the world: New estimates for 162 countries from 1999 to 2007. World Bank Policy Research Working Paper No. 5356. Washington, DC: The World Bank

[95] Anuradha Joshi, Wilson Prichard & Christopher Heady (2014) Taxing the Informal Economy: The Current State of Knowledge and Agendas for Future Research, The Journal of Development Studies, 50:10, 1325-1347, DOI: 10.1080/00220388.2014.940910

[96] Paul Hammond, Paul Adjei Kwakwa, Daniel Berko & Edmond Amissah. (2023) Taxing informal sector through modified taxation: Implementation challenges and overcoming strategies. Cogent Business & Management 10:3

[97] Keen, M. (2012). Tax and development – Again. In G. Zodrow & C. Fuest, *Critical issues in taxation in developing countries* (pp. 13–44). Cambridge, MA: MIT Press.

[98] Anuradha Joshi, Wilson Prichard & Christopher Heady (2014) Taxing the Informal Economy: The Current State of Knowledge and Agendas for Future Research, The Journal of Development Studies, 50:10, 1325-1347, DOI: 10.1080/00220388.2014.940910

[99] Vertical equity is a method of collecting income tax in which the taxes paid increase with the amount of earned income

[100] Pimhidzai, O., & Fox, L. (2012). Taking from the poor or local economic development: The dilemma of taxation of small informal enterprises in Uganda. CSAE Working Paper.

on the specific macro and fiscal indicators. At the household level, this policy produces adjustments both at the individual intensive and the extensive margins[101].

Simulation 2. An adjustment in the Personal Income Tax (PIT) rate structure and reduction of the sales tax rate (e.g., Value-Added Tax) by 1 percent on commodities that are primarily consumed by informal households (SIM2). This scenario seeks to compensate for the household loss of income through tax payment by reducing the prices of essential goods and to examine the welfare impacts of tax policy when targeted at poor people and those employed in the informal sector. Informal households pay indirect taxes on the goods they consume. Moreover, those working in the retail and trade sector pay VAT on their inputs but are not able to claim back as they are not formally registered as VAT traders, thus often pay additional taxes (Rogan, 2019[102]). Since, most of the informal households receive low income, reducing VAT on essential goods 1percent on top of increasing the PIT will likely reduce their burden of taxation and improve poverty and income inequality.

Simulation 3. An adjustment in Corporate Income Tax (CIT) rate (SIM3). Despite significant improvement in the collection of tax revenue (see section 2.1), the productivity of corporate income tax (CIT) in Tanzania has been low at 4.4percent similar to Rwanda but less than other comparator countries in the region (WB, 2023[103]). Among the reasons for the low productivity are reduced rates, tax holidays or exemptions which disproportionately favour some firms thus exacerbating income inequality. To ensure sustainable financing of development, especially from domestic sources, the government can significantly increase revenue collection from CIT. This tax is mainly paid by people from wealthy households who own firms, therefore increasing this type of tax by 5percent will likely affect income redistribution by reducing income inequality. The purpose of this simulation is to compare the effects of this policy on macroeconomic indicators, poverty, and inequality with the effects of increasing the tax on informal households. This will help the policymakers to weigh the benefits and costs of formal versus informal sector taxation.

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[101] At the individual level, the extensive margin refers to whether to work, while the intensive margin refers to how much to work. At the aggregate level, the extensive margin is typically measured by the number of individuals in paid employment, while the intensive margin is measured by the average number of working hours.

[102] Rogan, M. (2019). Tax Justice and the Informal Economy: A Review of the Debates. WIEGO

[103] World Bank (2023). Tanzania Economic Update: The Efficiency and Effectiveness of Fiscal Policy in Tanzania, Issue 19

Table 7. Summarizes the tax policies simulated under the three scenarios.

Scenarios	Description	Design
SIM1	Analyse the extent to which the extension of the tax base to cover the informal workers increases government revenue and influences workers' participation in the formal versus informal labour market.	Impose a flat Personal Income Tax (PIT) rate on informal households (20,000 TZS)
SIM2	This scenario seeks to compensate for the loss of revenue through tax payment by reducing the prices of essential goods and to examine the welfare impacts of tax policy when targeted to poor people and those employed in the informal sector.	On top of the flat PIT, we reduce the sales tax rate (e.g., Value-Added Tax) by 1percent on commodities that are primarily consumed by informal households.
SIM3	This scenario seeks to explore whether higher taxes in the formal sector reduce formal employment and increase informal employment	Increase corporate tax rate by 5percent (direct tax on firms) – currently, firms pay 30percent of their profits.

Source: Authors' construction

This section presents a summary of the short-run (the year 2025) and long-run (the year 2030) simulation results of the effects of the tax policy on the labour market.

5.1 Impacts on the Labour Market

High-income taxes both on informal households (SIM1 and SIM2) and on firms (SIM3) result in a **net increase in the labour supply in both the formal and informal labour markets** in the short and long term (Table 8). However, the increase in labour supply is slightly higher in the short term than in the long term. As the effects are relatively small, we present the estimates with up to three decimal places, particularly for the labour market which are of central importance in this study.

Increasing the PIT for informal households (**SIM1**) reduces after-tax income, thus workers reduce the consumption of all normal goods including leisure which induces them to allocate more time to market work. The supply of formal labour also increases for unskilled formal and skilled formal labour. That is formal employment increases as a result of the **reallocation of some labour from the informal to the formal labour market**. The increase in direct taxes for informal households in SIM1 induces some workers to seek jobs in the formal labour market especially unskilled formal workers due to flexible labour mobility. This can be explained by the fact that a tax increase erodes the financial benefit of remaining informal, as individuals often engage in the informal sector as a tax evasion strategy. So, as the tax burden increases it might be beneficial to transition to the formal sector where taxes are withheld by the employer (at the source).

The second simulation (SIM2) involves a reduction in the VAT rates for certain commodities (i.e., manufacturing, water and electricity, construction, and communication) that are primarily consumed by poor households along with increasing the PIT rate. The effects in this simulation are qualitatively similar to SIM1 except that, in SIM2 a 1 percent decline in VAT rate compensates for the decline in consumption of all normal goods including leisure, thus households increase their labour market participation by fewer hours compared to an increase in SIM1.

On the other hand, an increase in corporate tax by 5% in **SIM3 leads to the highest increase in the supply of unskilled formal workers as firms reduce demand for uncompetitive workers due to higher taxes** (Table 8). In the long term, the supply of unskilled formal and unskilled informal workers will outpace the supply of other workers implying that a persistent decline in labour demand by formal firms will affect unskilled workers the most.

Table 8. Supply of formal and informal labour, (deviation from BAU in percent)

Labour categories	Short-run 2025			Long-run 2030		
	SIM1	SIM2	SIM3	SIM1	SIM2	SIM3
Unskilled formal	0.035	0.034	0.027	0.034	0.032	0.025
Skilled formal	0.020	0.020	0.013	0.020	0.019	0.013
Unskilled informal	0.044	0.042	0.017	0.042	0.040	0.027
Skilled formal	0.026	0.025	0.017	0.025	0.024	0.016

Source: Model simulation results

All workers except skilled formal experience a decline in their wage rates (Table 9). Unskilled informal workers face the highest decline especially in SIM1 and SIM2 because high income tax makes the burden more visible as it affects a large portion of these workers' income, making them more sensitive to income changes. Conversely, skilled workers experience a relative increase in their wage rates as the demand for competitive workers does not fall due to higher taxes. This implies that simulated policies depress the incomes of already low earners thus exacerbating inequalities.

In SIM3, a decline in wages is a result of a reduction of competition for workers as firms lower demand for labour due to higher production costs. In addition, firms may scale back capital investment thus lowering demand for workers and laying off some workers as firms seek to maintain production amidst a higher tax burden. Labour demand is reduced in most sectors such as agriculture, manufacturing, business services, financial services, real estate, education, and other services.

Table 9. Changes in wage rates of labour by 2025 and 2030, (deviation from BAU in percent)

| Labour categories	Short-run 2025			Long-run 2030		
	SIM1	SIM2	SIM3	SIM1	SIM2	SIM3
Unskilled formal	-0.130	-0.123	-0.127	-0.120	-0.107	-0.120
Skilled formal	0.057	0.053	0.044	0.057	0.056	0.043
Unskilled informal	-0.235	-0.230	-0.143	-0.224	-0.205	-0.137
Skilled informal	-0.017	-0.016	-0.002	-0.017	-0.009	-0.003

Source: Model simulation results

5.2 Impacts on Production and Macroeconomic Indicators

The effect of simulated tax policies on the production of industries is mixed (Figure 13). In SIM1, the production of agricultural and public sector output declines. Agricultural output decreases by 0.07 and 0.05 percent in the short and long term respectively due to a low demand as a decline in disposable income reduces the

purchasing power, particularly of informal households who are the main consumers of these commodities. Further, **an increase in the PIT rate produces a rise in formal labour costs (the average formal wage is higher as there is no tax increase for these households) and thus induces formal firms to reduce their demand for labour and their production, particularly in the agricultural sector**. However, there is an additional margin of adjustment involved in the model where formal firms can choose to move into the informal sector to evade the income taxes.

Figure 13. Impact on the total aggregate output of industry (deviation from BAU in percent)
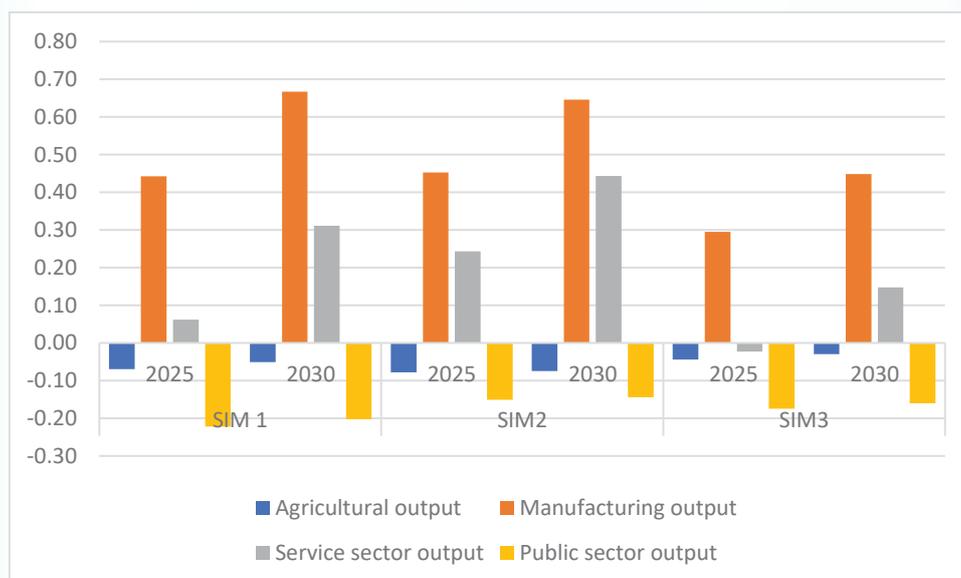
Regarding the public sector output, as tax revenue increases, government savings increase which results in increased investment expenditures to maintain the equilibrium. This reduces the real government demand resulting in a reduction of public sector output by 0.22 and 0.20 percent in the short and long term respectively, thus releasing, especially formal labour to other sectors of the economy. This situation could raise the unemployment rate, especially among unskilled workers.

Contrary manufacturing and service sectors' output increases due to the relatively high demand of these commodities as they are mainly consumed by formal households whose incomes have remained comparatively higher. Moreover, low wages because of increased income taxes lower the production costs and boost the output in these sectors.

In SIM2 the effects on production are similar in direction to those in SIM1, except the output of the service sector increases more, and a decrease in public sector output is less. This means a reduction of the VAT rate on essential goods has more favourable growth effects on the service sector output through a boost in consumption. In SIM3 increasing corporate tax increases only manufacturing output in the short term by 0.3 percent, while in the long-term manufacturing and service sector output increases by

0.45 and 0.15 percent respectively. However, the increase is less than in SIM1 and SIM2 implying that higher CIT reduces firms' incentives for investment leading to low output growth.

Figure 14 presents the impact of the tax policy shocks on the size of the formal and informal sectors, measured in terms of value added (labour and capital employed). **The results of all simulations (SIM1, SIM2, and SIM3) confirm that the size of the value added in the informal sector increases more in the short term than the value-added created in the formal sector.**

Figure 14. Impact on the size of the formal and informal sectors (deviation from BAU in percent)

Source: Model simulation results

Table 10 presents result for the macroeconomic effects of the tax reform under the three scenarios. We first consider the first simulation which reports results for the budget condition with fixed Government Expenditure and flexible Government Savings starting with **the increase in the personal income tax rate for informal households (SIM1)**. Under the unbalanced budget condition, we assume some specific closures[104] in which real government spending does not have to be reduced to match the change in revenue. The implicit assumption here is that the government would run a budget deficit by borrowing and the payment is deferred into the future period.

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[104] The model closure rules are explained in detail in Section 4.1.

Table 10. Macroeconomic impacts (deviation from BAU in percent)

Macroeconomic indicator	SIM1		SIM2		SIM 3	
	Short-run	Long-run	Short-run	Long-run	Short-run	Long-run
	2025	2030	2025	2030	2025	2030
Real GDP	0.06	0.08	0.03	0.05	0.02	0.04
Real private consumption	-0.19	-0.18	-0.15	-0.14	-0.11	-0.11
Real investment	0.97	0.99	0.51	0.53	0.67	0.69
Real government consumption	-0.013	-0.015	-0.008	-0.008	-0.01	-0.01
Real exports	0.06	0.03	0.06	0.08	0.01	0.04
Real imports	0.03	0.02	-0.02	-0.03	0.02	0.01
Consumer price index	-0.06	-0.07	-0.11	-0.11	-0.03	-0.04
Average wage rate in the formal labour market	0.05	0.05	0.05	0.06	0.04	0.04
Average wage rate in the informal labour market	-0.03	-0.02	-0.03	-0.03	-0.01	-0.01

Source: Model simulation results

According to simulation results, increasing the PIT for informal households (**SIM1**) is expected to increase real GDP by 0.06 and 0.08 percent in the short and long term respectively driven by higher real investment and exports. This is despite a decline in real government consumption by 0.013 and 0.015 percent in the short and long term to maintain the budget neutrality position. The increase in exports is due to higher manufacturing and service sector output.

Despite the reduction in the consumer price index, real private consumption declined. An increase in income tax reduces the average wage rate of informal workers, their disposable income, and their purchasing power. A larger percentage change in the wage rate (in absolute value) in the informal compared to the formal sector is attributed to the fact that those workers earn low income which makes them more sensitive to income changes as the burden of tax increases. Therefore, **increasing the income tax rate harms the real income of informal households and reduces their demand for commodities.**

The impact on macroeconomic indicators in **SIM2** is similar in direction to those in SIM1, except for a reduction in imports. The combination of two policy shocks (increasing the PIT for informal households and reducing the VAT rate for certain commodities) leads to a reduction in household disposable income that negatively affects household consumption. However, the reduction of household consumption is smaller compared to SIM1, which is mainly due to the offsetting effect of the VAT rate reduction. Indeed, the lower the VAT rate, the cheaper domestic goods are than those

produced in other countries. Thus, household consumption decreases only by 0.15 and 0.14 percent in the short and long term, respectively.

As mentioned in Section 5.1, production of agricultural and public sectors declines and the firms reduce demand for labour, especially informal unskilled labour. **The decline in labour demand is reflected by 0.03 in the short and long term by a decrease in average real wage in the informal labour market.**

At the same time, the reduction in the average real wage in the informal labour market leads to lower production costs, making domestically produced goods relatively cheaper than imported ones. Consequently, there is a decrease in import demand by 0.1 percent during the total simulation period compared with the increase in import demand in SIM1, and an increase in exports. **Overall, real GDP increases at a lesser rate (0.03 percent and 0.05 percent - in the short and long run, respectively) compared with SIM1.**

The third simulation (SIM3) involves **a 5 percent increase in corporate tax. Contrary to the effects of the two previous policies, this one does not produce first-round adjustments in the labour market, since it does not affect the real cost of labour in the formal sector (for a given price level).** It does involve adjustments at the extensive margin though formal firms can evade the tax by operating in the informal sector.

Most results are qualitatively similar to those obtained in the previous simulation. However, due to low growth of output and a subsequent low exports growth, the increase in real GDP is less compared to SIM1 and SIM2. In particular, the economy is operating on the upward segment of the Laffer curve for profits taxes, since government receipts increase in the short and long runs, respectively. Fiscal impacts are discussed in the next section.

5.3. Impact on Tax Revenue

The immediate impact of the tax policy change (SIM1) is an increase in the government's revenue from personal income taxes. As shown in Table 11, the government revenue from income taxes increases by 6.46 percent in the short and long run.

The total Government's revenues from other taxes change marginally. For instance, taxes on products and capital income remain almost unchanged (a rise of 0.07 and 0.01 percent in the short term respectively). Duties on imports decrease marginally by 0.002 percent in the short term. However, according to variations of imports, the share of the total taxes and duties on imports mobilized by the industry, services, and agricultural sectors rises slightly by 0.001 percent in the long term.

Table 11. Impact of government incomes, (deviation from BAU in percent)

	SIM1		SIM2		SIM 3	
	Short-run 2025	Long-run 2030	Short-run 2025	Long-run 2030	Short-run 2025	Long-run 2030
Government revenue from indirect taxes	0.07	0.08	-0.87	-0.86	0.05	0.06
Government revenue from import duties	-0.02	0.001	0.01	0.02	-0.01	0.01
Government revenue from income taxes	6.46	6.46	6.46	6.46	4.73	4.84
Government transfer income	-0.02	-0.02	-0.03	-0.02	-0.39	-0.39
Government capital income	0.01	0.02	0.03	0.04	0.01	0.02
Total Government revenue	0.93	0.94	0.49	0.51	0.71	0.72

Source: Model simulation results

According to the updated and modified 2022 SAM for Tanzania, salaried formal households contribute about 90.2 percent to the total government's revenue from household income taxes. The contribution of informal households to the government income tax revenue is only 9.8 percent. Thus, a flat tax rate of 20,000 TZS on informal households increases the total government revenue by only 0.93 and 0.94 percent in the short and long term respectively. Despite the decline in government transfers, capital income tends to increase its overall receipts.

Under the combined policy (SIM2) the magnitudes of the impacts reflect the cumulative impacts of the two policies. The combined policies result in an increase in government revenue by 0.49 and 0.51 percent (in the short and long runs, respectively), despite the reduction in total government indirect tax income by 0.86 and 0.87 percent in the short and long runs.

The immediate impact of the policy (SIM3) is an increase in corporate income tax (CIT) revenues by 4.73 and 4.84 percent in the short and long run respectively. The policy also has impacts on other government budget components. For example, PIT revenue decreases because of the decline in wages, which is required to keep the economy at a low rate of unemployment. There is a slight decline in import tariffs by 0.01 percent in the short run, which indicates that the level of imports declines slightly.

Generally, simulated scenarios show that a flat income tax rate on informal households can potentially raise more government revenue compared to a 5% increase in the CIT. Moreover, lowering the VAT rate for societal redistributive concerns results in less government revenue.

5.4   Impacts on household income

All simulations result in a reduction of households' total incomes. An increase in income taxes hurts the nominal income of informal households in the short term (figure 15). However, in the long term, in SIM 1 and SIM2, the nominal incomes of informal households are positive.

Figure 15. Percentage change in household income (Simulations 1,2 and 3)
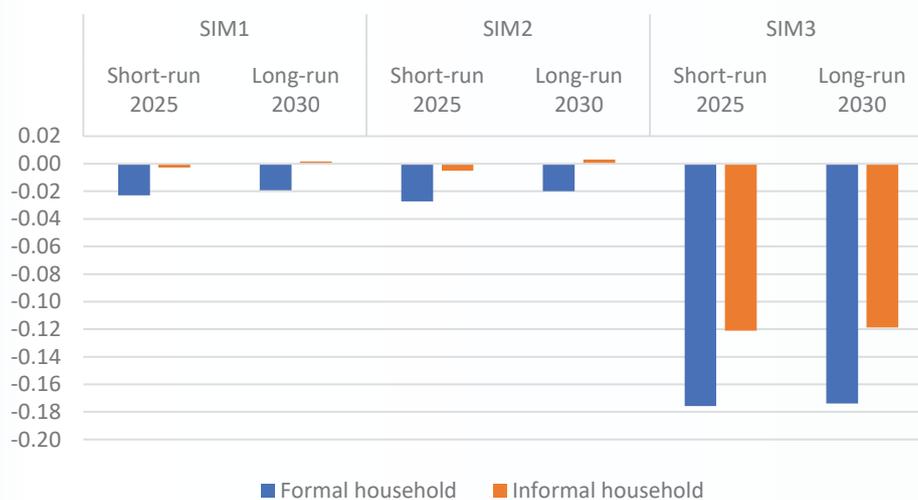
Source: Model simulation results

This could be explained by the fact that informal households encompass the own account workers, the informal private salaried workers, and the formal salaried workers. Each individual within an informal household receives different sources of income. As we observed in the previous sections, the wage in the formal labour market increases compared to the wage in the informal market, thus the increase in the formal wage tends to enhance the labour income of workers within informal households (figure 16). Therefore, formal workers can compensate for the loss of labour income in informal households.

Figure 16. Percentage change in household's labour income (Simulations 1,2 and 3)
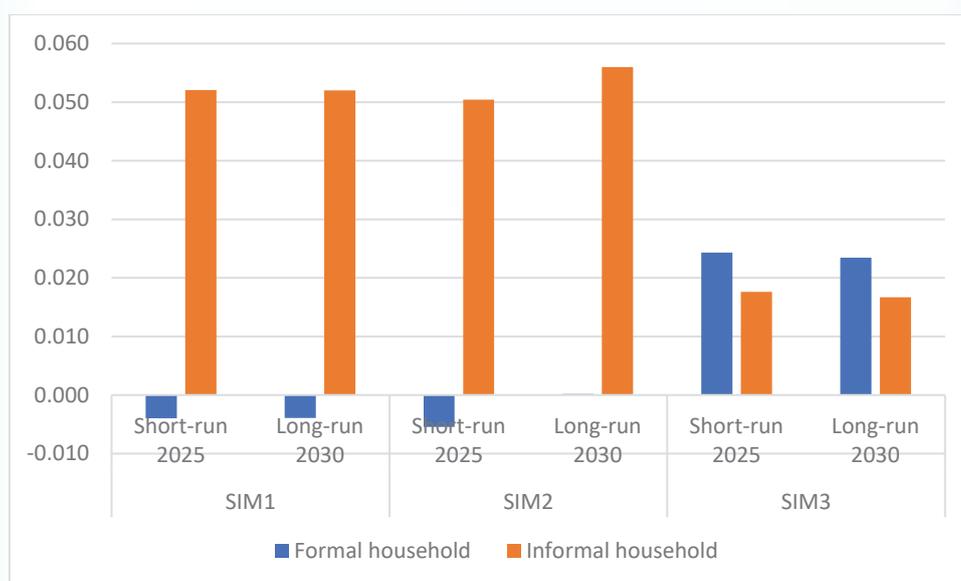
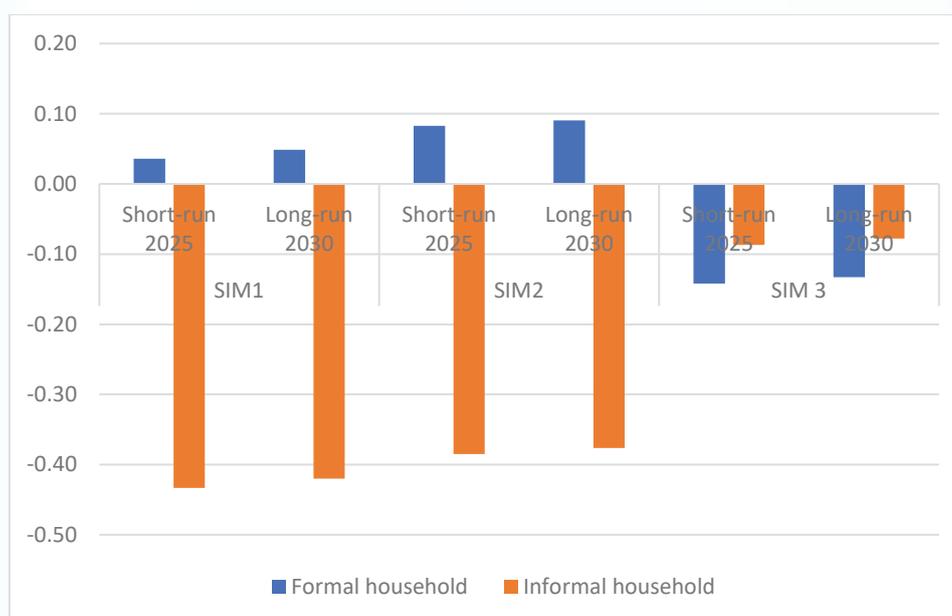**Source**: Model simulation results

Direct taxation of household income could also have undesirable long-run effects for at least two reasons. First, we have an efficiency loss due to the substitution effect between labour (used to purchase commodities) and leisure. Second, and more importantly, for the present case, the tax rates on household income could have negative impacts on private savings with negative implications for dynamic capital accumulation.

However, the consumer price index decreases more than a decrease in nominal income (Table 6). Therefore, household's purchasing power increase, which indicates potentially decrease in poverty level (see detailed explanation in the next section).

5.5   Impacts on household consumption

Figure 17 presents the effects of the tax reforms on the real household consumption budgets in the short and long runs. Under the PIT policy (SIM1), the formal households which mainly derive their income from the formal sector of the economy increase in consumption of most commodities (i.e., agriculture, food, and services). While informal households significantly reduce their spending. The same pattern is observed in the simulation 2 (SIM2).

Figure 17. Percentage change in real household consumption, (Simulations 1,2 and 3)

Source: Model simulation results

As shown in Figure 17, with VAT tax intervention, demand for commodities in this simulation is higher compared to SIM1. It can be assumed that the sales tax intervention counters the negative effect of direct taxation of informal households.

In simulation 3 (SIM3), despite the reduction in consumer prices, real household consumption is decreasing for both household categories, with formal households experiencing the largest declines in real consumption, while informal households are the least affected.

5.6   Microsimulation analysis of household income distribution

### 5.6.1 Impacts on Poverty and Income Inequality

The trend of poverty rate (headcount poverty) and poverty gap for all simulations are presented in Figure 18. In SIM1 the poverty rate records a slight increase of 1.2% in the short run as the burden of tax falls on the informal poor households. A small decline in the poverty rate is noted in the short term (2025), while the rate remains slightly higher than the baseline values in the long term.

A policy mix in SIM2 which combines the increase in income tax with a decrease in the VAT rate on essential commodities mainly consumed by the poor, decreases the poverty rate by 1.3% compared to SIM1. This underscores the potential of the lower VAT rate to boost household consumption and reduce poverty levels. Contrary, the poverty rate increases steadily in SIM 3 as household consumption falls due to lower wages and higher prices from the producers. This implies that the burden of corporate

tax is passed to the final consumers which results in lower consumption levels and higher poverty rates.

While in SIM1 and SIM2 only informal households' consumption decreases, in SIM3 consumption of all households decreases relative to the baseline which explains a comparatively higher increase in the poverty rate.

Figure 18. Evolution of poverty rate and poverty gap in Simulations 1, 2 and 3
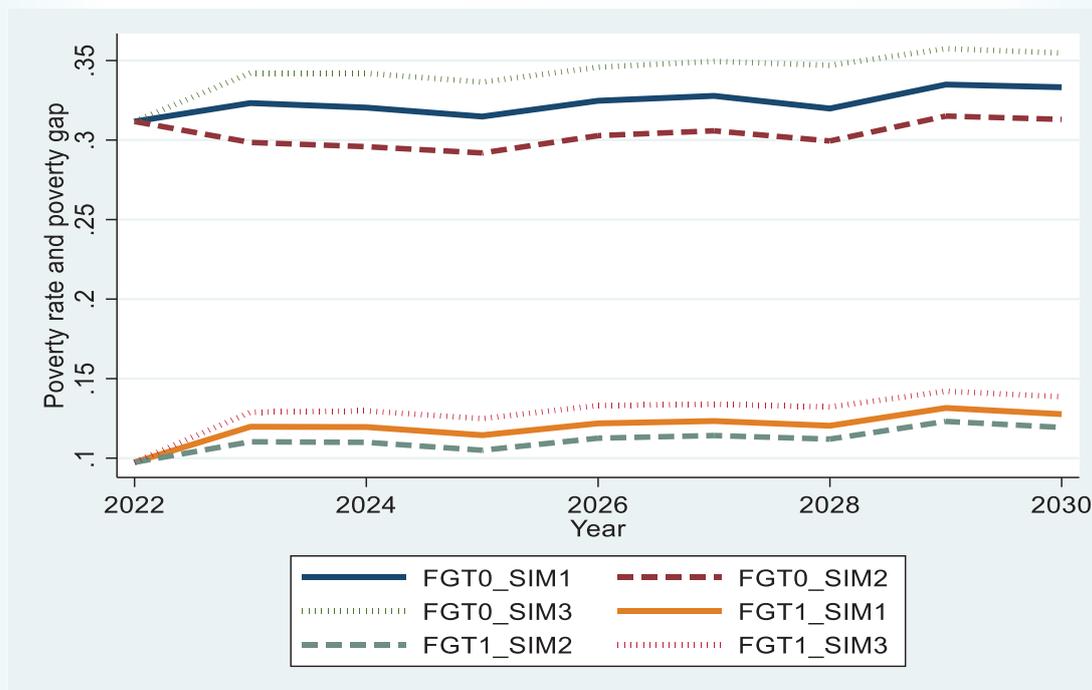
Source: Model simulation results

The poverty gap also increases across all simulations, with the highest increase in SIM3. The lowest increase in the poverty gap is observed for SIM2 revealing that compensating a higher income tax on informal households with a lower VAT rate has less distributive effects compared to other simulations. This is also observed in the evolution of income inequality measured by Gini index (Figure 19). Income inequality increases more in SIM1 (1.1%) compared to SIM2 (1%), while in SIM3 higher corporate taxes lead to the highest increase in income inequality by 1.6%. These results are consistent with the results of Levin, 2005[105], who found that increased taxation of the informal sector generally would increase poverty.

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[105] Levin, J. (2005). Taxation in Tanzania – Revenue performance and incidence. Sida: Country Economic Report

Figure 19. Evolution of Income inequality in Simulations 1, 2 and 3
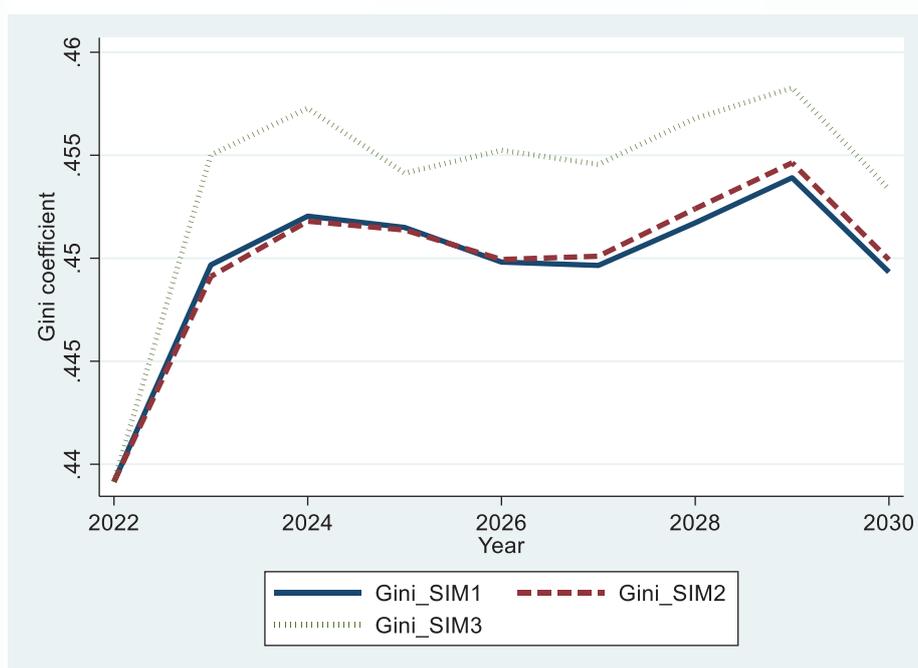
Source: Model simulation results

5.7 Sensitivity analysis

We conduct the sensitivity analysis to check the robustness of the study findings using low and high values of income elasticities of labour supply (Table 12). This elasticity is of central importance to this study as it determines how households' labour supply adjusts to changes in income taxation. We change the elasticity by -16% for the low value and by 16% for the high value.

Table 12. Sensitivity of macro indicators income elasticity of labour supply

	SIM1		SIM2		SIM3	
	low elasticity	high elasticity	low elasticity	high elasticity	low elasticity	high elasticity
Indicator	(-16%)	(+16%)	(-16%)	(+16%)	(-16%)	(+16%)
Real GDP at basic prices	0.06	0.07	0.05	0.05	0.04	0.05
Consumer price index	-0.07	-0.07	-0.11	-0.11	-0.04	-0.04
Labour supply						
Unskilled formal	0.03	0.04	0.03	0.04	0.02	0.03
Skilled formal	0.02	0.02	0.02	0.02	0.01	0.01
Unskilled informal	0.03	0.05	0.03	0.05	0.02	0.03
Skilled formal	0.02	0.03	0.02	0.03	0.01	0.02
Real consumption of formal households	0.05	0.05	0.09	0.09	-0.13	-0.13
Real consumption of informal households	-0.42	-0.42	-0.38	-0.37	-0.08	-0.08

Source: Model simulation results

We observe that maximum hours available for market work and leisure are reduced when a low value of elasticity is used and rise when a higher value of elasticity is used. However, the simulation results do not change significantly across all simulations, as they show a consistent small variation of macroeconomic indicators, demonstrating the robustness of the model results.

6. Conclusions and policy implications

The informal sector constitutes an important part of the economy in developing countries, employing in some cases more than half of the labour force. In such an environment, we take the view that the informal sector is not residual and therefore faces the same type of labour and product market imperfections as the formal one.

We used a macro–microsimulation approach to analyse the impact of different tax policies in **Tanzania characterized by a large informal sector in terms of employment and its low contribution of tax revenue to the government budget**.

Three policy scenarios were simulated. The first was an adjustment in the PIT rate structure (SIM1-increase in the personal income tax rate). The second simulation (SIM2) involves a reduction in the sales tax rates for certain commodities (e.i., manufacturing, water and electricity, construction, and communication) that are primarily consumed by poor households along with increasing the PIT rate. The third simulation (SIM 3) was to increase the corporate income tax rate.

It was shown that all policy changes result in an increase in tax revenue and a positive impact on economic growth. The drivers of growth come mainly from an overall increase in sectoral output and an increase in exports due to lower production costs.

All policy reforms reallocate formal employment from the excess labour industry (government services) to other industries. The formal labour in the government sector (which is highly labour-intensive) is absorbed by other industries at a lower wage. The outputs of export-oriented commodities increase due to an increase in domestic and international demand resulting from increasing trade competitiveness of domestically produced goods induced by a reduction in production costs. The increase in industrial output also leads to increased investment.

The interesting result of our simulations concerns the relationship between the size of the informal sector, labour supply, and the level of income inequality and poverty. **All policy reforms reveal an increase in the size of the informal sector, leading to increased levels of inequality and poverty in the short term**. Such a relationship is verified by the fact that informal households increase the labour supply to adapt to new changes in the economy. **Thus, they seek additional work in the informal labour market to offset their income after deducting high-income taxes**. However, the labour market (on the labour demand side) cannot adjust to absorb the excess labour supply in the short term. **Thus, increasing the income tax rate harms the real income of informal households and reduces their demand for commodities.**

The study results pose several implications for reducing poverty and improving income inequality in Tanzania. First, there is a need for future indirect tax (e.i., VAT) cuts to be targeted towards the poor households who are mainly employed in the informal

sector. This can be done through the reduction of commodity tax for the commodities that are heavily consumed by the poor.

Second, there is a need to ensure that the increased tax revenue is directed to finance investment and other development projects to promote inclusive growth. According to our results, higher income tax adversely affects labour demand which fuels unemployment in the economy. Taxation reforms should thus consider a mix of tax instruments in line with efforts to boost investment in the country. This would ensure higher government revenue with less effects on unemployment and overall economic growth. Moreover, a well-designed income tax policy can be a potential tool for income redistribution among households in the country. **A more sustainable approach to reducing poverty is for the government to accelerate its rural development policy.**

According to our results, an increase in income tax for informal households adversely affects informal workers more compared to formal workers. Income tax reforms should thus seek to provide subsidies to the informal workers in the form of improved infrastructure, training on market access, etc. to facilitate their transition to the formal sector instead of increasing taxes to this category of workers. Such an approach would be more effective in addressing poverty because most informal households live in rural areas and work in the agricultural and non-business services (Sen, 2019[106]; 2023[107]) sectors.

In conclusion, it is useful to consider the limitations of the study and ways in which it could be extended in future work. One of the limitations is that we developed a dynamic model in this study which is useful for addressing "what if" policy questions. It would be desirable to extend our dynamic CGE model with a focus on public budget optimization and financing mechanisms in the future to undertake a more comprehensive analysis. For example, using such a model, it would be possible to evaluate more complex government policies such as a decision to invest and raise capital that would contribute to capital accumulation and growth in the future, and which may encourage informal workers to move into the formal sector of the economy.

Policy Implications

- When considering including the informal workers in the tax net, policymakers should implement complementary measures such as reducing the Value Added Tax (VAT) on essential goods. This policy intends to compensate for the potential loss of income due to higher taxes, particularly among poor informal households. This approach will help to address income inequality concerns, ensure the taxation policies are progressive and promote inclusive growth.
- Taxing the wealthy- through corporate tax is an effective strategy for raising additional tax revenue. However, to lessen the potential negative effects of

[106] Sen, K. (2019) 'Structural Transformation around the World: Patterns and Drivers', *Asian Development Review,* 36(2), pp. 1-31
[107] Sen, K. (2023) Varieties of Structural Transformation: Patterns, Determinants, and Consequences Cambridge: Cambridge University Press. Elements in Development Economics

corporate tax increases on labour demand, economic growth and informality, targeted tax incentives for labour-intensive firms such as those in manufacturing can be adopted. This will facilitate an increase in demand especially for unskilled informal labour thus reducing informality.

- While a flat tax rate on informal households offers simplicity in tax administration, it is regressive in nature as the burden falls heavily on the poorer households. Thus, targeted expenditure on development projects can create future investment and growth opportunities while cultivating the tax-paying culture among informal households.

- The increase in the poverty rate and inequality due to higher income taxes underscore the need for policymakers to prioritize equity and societal welfare when designing tax policies. To reduce such impacts on the vulnerable population, the government could improve infrastructure and promote formal firms' investments through better policies and regulatory environment.