Income distribution and the potential of redistributive systems in Africa: a decomposition approach[1]

Olivier Bargain [a], H. Xavier Jara [b], Prudence Kwenda [c], Miracle Ntuli [c]

[a] Bordeaux Université and Institut Universitaire de France
[b] Institute for Social and Economic Research (ISER), University of Essex
[c] University of the Witwatersrand, Johannesburg

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Abstract

Redistributive systems in Africa are still in their infancy but are expanding in order to finance increasing public spending. This paper aims at characterizing the redistributive potential of six African countries: Ghana, Zambia, Mozambique, Tanzania, Ethiopia, and South Africa. These countries show contrasted situations in terms of income distribution. We assess the role of tax-benefit systems to explain these differences. Using newly developed tax-benefit microsimulations for all six countries, we produce counterfactual simulations whereby the system of the most (least) redistributive country is applied to the population of all other countries. In this way, we can decompose country differences in income distribution into the contribution of tax-benefit policies and the contribution of other factors (market income distribution, demographic structure, etc.). This analysis complements the recent literature on the redistributive role of socio-fiscal policies in developing countries and highlights the advantages of microsimulation and decomposition techniques to characterize how different African countries can learn from each other to improve social protection and reduce inequality.

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1. Introduction

Most developing countries tend to build up their redistributive and social protection systems. Direct taxation is constantly expanding in order to finance increasing public spending while social programs are being scaled up in many countries. This is particularly the case in Latin America where tax systems and numerous cash transfer programs are already in place in many countries (Robles et al., 2015). To some extent, this is also the case in Africa, although African redistributive policies are still in their infancy and cannot achieve their full potential due to a very large informal sector (Beegle et al., 2016). Yet, financing public expenditure and redistribution is especially important for countries characterized by widespread poverty and social tensions. In particular, many argue that universal cash transfers, even in a modest form, could be very effective in alleviating financial hardships among the most vulnerable (Banerjee and Duflo, 2019). In the absence of universal health-care systems, they would also help to cushion recurrent adverse shocks such as natural disasters and pandemics.[2] These considerations have to be placed in more comprehensive characterizations of the role of redistributive policies that account for targeting issues, political economy and the efficiency costs of implementing sizeable transfer programs (Lustig et al., 2019, Gentilini et al., 2020).

The development of direct forms of taxes and transfers is a challenge in Africa because benefit targeting and tax progressivity require conditionality on income, which is not easily done in this context. In many African countries, a majority of household members are unpaid workers, engaged in self-production or hold informal jobs on the labour market. In all these cases, actual consumption is disconnected from standard income streams. Despite these difficulties, it may be worth characterizing the redistributive potential of African socio-fiscal policies with the perspective of future gradual expansions of policy instruments. Looking at the Latin American experience, it turns out that the reduction in household income inequality and poverty in the recent years was not all due to wage compression but also on account of the development of more progressive income taxation and higher cash transfers to vulnerable populations (Messina and Silva, 2019).[3] A rise of direct taxation is also observed in countries like South Africa, together with increases in well-targeted social expenditure, which contribute to reduce inequality (Odusola et al., 2017).

Against this background, we suggest one of the first prospective exercises aimed to characterize the role and redistributive potential of tax-benefit policies in an African context. Our analysis focuses on six African countries at different levels of development, namely Ethiopia, Mozambique, Tanzania (low-income), Ghana, Zambia (lower-middle-income) and South Africa (upper-middle-

[2] The present paper is revised in the middle of the COVID19 crisis, at a time where lockdowns in poor African countries are forcing many households to decide between the risk of the virus and the certainty of going hungry if they abide by social distancing orders. Many analysts are calling for immediate action to scale up the infrastructure for universal cash transfers in Africa (The Lancet, 2020).

[3] According to Cord et al. (2014), around one-third of changes in income inequality in Latin America in the 2000s can be attributed to the development of redistributive systems.

income). We rely on a novel set of tax-benefit microsimulation calculators, combined with national representative surveys for these countries (Gasior et al., 2018, Decoster et al., 2019). As extensively discussed hereafter, our approach complements other analyses of socio-fiscal policies in Africa based on incidence methods (Inchauste et al., 2015; Lustig et al., 2019). Our work relies on microsimulation models, which are computer programs performing the computation of taxes and social contribution paid, and benefits received, by a household depending on its income and demographic characteristics. Plugged to representative household surveys, these programs can reproduce the existing redistribution operated by actual policies. They can also be used to perform counterfactual simulations, such as applying the whole system of country A to the population of country B, i.e. 'policy swaps'.

This technology has been used in Europe to analyse the distributional potential of different socio-fiscal systems (Atkinson and Bourguignon, 1990). In the same spirit, we suggest the simulation of alternative policies that are realistically implementable in an African context, or can at least serve as a benchmark, namely those in force in neighbouring countries. As we will show, this type of counterfactual simulation provides a clean way to assess the redistributive impact of each national tax system in comparison with the others (Bargain et al., 2017). It also provides a platform from which to explore more effective means of redistribution—whether for individual states or with reference to policy harmonization initiatives at regional or sub-regional level (e.g. Ade et al., 2017). In the present paper, 'policy swap' counterfactuals are used in a formal decomposition that quantifies the extent to which cross-country difference in inequality or poverty is due to tax-benefit systems compared to other factors (including market income distribution, demographic structure or non-simulated policies).[4] For this exercise, we simply apply the most redistributive system (South Africa) – or alternatively apply the least redistributive system (Mozambique) – to the data of the five other countries. Any country could serve as a benchmark for the characterization based on our decomposition approach: the choice of the polar cases is merely convenient and not necessarily aimed at normative interpretations and prescriptions. Importantly, counterfactual simulations used in our decomposition are 'adjusted' policy swaps, i.e. they account for the fact that countries under analysis differ in level of development by adjusting all monetary parameters of the imported tax-benefit system to the living standards of the 'importing' countries.

Our results go as follows. We confirm the small redistributive power of current tax-benefit systems in Ghana, Zambia, Mozambique, Tanzania and Ethiopia, and the larger redistributive effect of the South African system. Part of the inequality gap between South Africa and the other countries – and, to a less extent, part of the poverty gap – fades away when the South African system is exported and adjusted to these countries. Under this counterfactual scenario, a reduction in their Gini coefficient would range from 3.3 points in Ghana to 19.3 points in Ethiopia.

[4] The 'other' factors include non-simulated policies, e.g. labour market policies, such as minimum wages, public sector wage setting or the presence of trade unions – see Kerr and Teal (2012) for an analysis of some of these policies in the African context.

Income poverty would decrease by 2.2 points in Mozambique and by up to 17.8 points in Tanzania. These effects are due to the relatively more generous social benefits in force in South Africa and, in the case of inequality only, to a small contribution of the South African tax progressivity. Results from alternative simulations that consist in exporting and adjusting one of the least redistributive systems (Mozambique) are consistent. Results mainly establish the weakness of Mozambican social benefits (rather than taxes) compared to those in South Africa. Mozambican policies would increase the Gini and the poverty rate in this country but would have little effects elsewhere – as the difference with other countries is essentially on account of other factors (market income distribution and demographics). However, in some cases and notably in Tanzania, the Mozambican tax system deteriorates inequality indices due to its regressive nature.

The remainder of this paper is structured as follows. Section 2 presents statistics on tax-benefit systems in the countries under study. It also summarizes previous research on the redistributive effect of tax-benefit systems in Africa. Section 3 describes the data, the microsimulation models and presents the decomposition approach used in the analysis. Section 4 shows and discusses the results while Section 5 concludes.

2. Development indicators and tax-benefit systems of the countries under study

This section provides a general overview of selected development indicators and characteristics of tax-benefit systems, notably their size, composition (by type of instruments), and redistributive effect, of the six countries under study.

Development indicators. Our analysis focuses on six African countries at different levels of development. **Table 1** shows that South Africa is the richest country while Zambia and Ghana are classified as lower middle-income countries and Mozambique, Ethiopia, and Tanzania as low-income countries. GDP/capita levels harmonize with other social indicators (e.g. human capital and life-expectancy) as per the United Nations' Human Development Index (HDI). In 2015, the HDI of these countries fell within medium and low development categories (World Bank, 2017). Mozambique, Ethiopia and Tanzania fared worse as they correspondingly ranked 181, 174, and 151 out of 188 countries in the world. South Africa (119), Ghana and Zambia (139) ranked as having medium human development (World Bank, 2017).

Socio-fiscal instruments and redistributive effects

For the six countries studied herein, the major socio-fiscal instruments include indirect taxes, progressive direct taxes, employee social insurance contributions and pro-poor social spending. We now provide a brief overview of these instruments and present a summary of their main parameters in **Tables A.1-A.3** in the Appendix.

Taxes. **Table 1** shows that tax collection varies substantially across the countries under analysis with tax revenue ranging from 12% of GDP in Ethiopia to 27% of GDP in South Africa. In most

countries, tax revenues are mainly due to taxes on goods and services rather than incomes and profits which have the highest potential to redistribute income. There is variation in personal income tax rates across countries. However, the top tax rate is broadly similar in most countries, around 35 percent. Particularly, South Africa has the highest top-tax rate at 41 percent while it is lowest in Ghana at 25 percent.

Table 1: Socio-Economic Indicators for the African Countries under study

	Population (millions)	Income level	GDP/capita (US$)	HDI rank	Total tax revenue to GDP (%)	Taxes on income & profits to GDP (%)	Social expenditure to GDP (%)
South Africa	55	upper middle	12,106	119	27.3	7.4	9.8
Mozambique	28	low	1,070	181	21.9	7.7	5.3
Zambia	16.2	lower middle	3,800	139	16.8	8.1	5.5
Ghana	27.4	lower middle	3,864	139	15.0	5.2	5.4
Ethiopia	99.4	low	1,336	174	11.8	7.5	3.2
Tanzania	53.5	low	1,718	151	13.6	8.7	6.8

Authors' calculation using various data sources from the World Bank, the ILO and the OECD. Figures refer to year 2015, excepted social expenditure for 2011-2013.

Social insurance contributions. In all countries, social insurance contributions (SICs) are generally mandatory for formal sector employees. Contribution rates vary widely across countries. South Africa has the highest employee pension contributions rate (7.5%) followed by Ethiopia (7%). Mozambique has the lowest contribution rate for employees (3%). In addition to retirement pension, SICs in some countries entitle workers to disability or invalidity benefits (Zambia, Ghana, Ethiopia), survivor's pensions (Zambia, Mozambique, Ethiopia) and health benefits (Mozambique, Ethiopia, Tanzania). In South Africa, employees also contribute towards the Unemployment Insurance Fund, UIF (1% of gross income). UIF entitles a worker to short-term income relief in case of unemployment or illness, maternity/adoption leave and covers dependents in the event of death (SARS, 2020).

Transfers. **Table 1** indicates that the level of social spending in proportion of GDP is low in all countries with an average of 6%. However, the extent of social spending varies enormously across countries with marginal spending in Ethiopia, intermediary situations in Tanzania, Ghana, Mozambique and Zambia and higher levels in South Africa. It is only in the last decade that there has been a shift from emergency aid to more permanent social protection programs, leading to pilots of cash and in-kind transfer programs in poor African countries (Barrientos, 2010). All countries except South Africa have one main cash transfer program targeting vulnerable population groups. A series of different programs exist in South Africa which target specific groups such as children, the elderly, individuals with disabilities and carers. Another important characteristic of transfers in South Africa relates to the use of means-testing to target vulnerable populations, whereas the other countries under analysis relay on proxy means-testing to detect

eligibility. The South African system is relatively sophisticated, progressively developed as part of its national rebuilding programme since the end of political apartheid. This country spends, for instance, on non-contributory means tested old-age grants while the other countries do not. It reaches almost 10% of GDP on social spending including 3.3 percentage points dedicated to social assistance transfers. Yet this is low on international standard.

Inequality and poverty. With low levels of redistribution, Sub-Saharan African countries are saddled by high levels of poverty and inequality. Poverty is on average high in the continent but there is substantial variation across countries (Fosu, 2015). Using per capita consumption and the standard poverty line of $1.90 per day, poverty headcount reached 42.3% in sub-Saharan Africa compared to 31% in Latin America (World Bank, 2013). Income inequality as measured by the Gini coefficient was 41.1 in 2000–2009 compared to 36.7 for Asia (Odusola, 2017) but below the levels observed in Latin America (52.1 in the 2000s according to World Bank, 2013, decreasing to 48 in the 2010s, according to Lustig, 2017)[5]. Despite its middle-income status, South Africa hides a large extent of poverty and one of the highest inequality rates in the world, suggesting that the resources devoted to social expenditure have not yielded much dividends towards solving its social challenges. It is nonetheless comparably more redistributive than the other selected countries. Several other studies suggest that poverty and inequality in South Africa could have been higher still without its current socio-fiscal policy (Inchauste et al., 2015; Higgins and Lustig, 2016; Lustig 2017; World Bank, 2017). Further evidence using fiscal incidence analyses shows that for Zambia, Tanzania, and Ghana, the poor are impoverished by the fiscal system; headcount poverty increased after taxes and state transfers compared to the before scenario (Higgins and Lustig, 2016; Lustig, 2017; de la Fuente et al., 2017).

Against this background, a proper characterization of the relatively more/less redistributive capacities of the different systems requires analytical frameworks such as microsimulation models with room for comparability across countries and the possibility to perform counterfactual simulations. Currently, such literature lacks in an African context and the present study makes a first attempt at such an analysis.

3. Methodology and data

We start this section by presenting the context in which microsimulation models and decompositions are used to characterize socio-fiscal redistribution in rich and poor countries. We then provide a detailed description of the decomposition approach used to evaluate the redistributive effect of African tax-benefit systems. Finally, we present the tax-benefit microsimulation models and the associated datasets used in our simulations. We also describe

[5] It is worth noting that poverty and inequality figures reported by the World Bank (2013) and most studies are based on consumption for African countries but on income for Latin American countries, which poses challenges for comparability. We come back to the discussion on consumption versus income throughout this study.

the policies covered by the models, modelling assumptions and how simulations compare to external statistics.

3.1 Microsimulation and decomposition in context

Tax-benefit microsimulation in a comparative framework. The present paper takes advantage of the very recent development of microsimulation capacity for six African countries, following the SOUTHMOD initiative launched by the United Nations University World Institute for Development Economics Research (UNU-WIDER), the EUROMOD team at the Institute for Social and Economic Research (ISER), and the Southern African Social Policy Research Insights (SASPRI). This project gave birth to integrated tax-benefit microsimulation models for Ghana, Zambia, Mozambique, Tanzania, Ethiopia, and South Africa which are used in this paper. Some work has been undertaken to improve the harmonization and comparability of the models (Gasior et al., 2018). Relying on nationally representative survey information on household market income, demographic, and employment status, these models calculate taxes and contributions paid by formal sector workers as well as the benefits received by eligible households. The different models follow the same modelling conventions and offer similar data treatment for source income and household characteristics, hence guaranteeing a harmonized framework for international comparisons (see Sutherland and Figari, 2013). This allows us to easily perform policy swaps and assess the distributional potential of African tax-benefit systems in a comparative way.[6]

Counterfactual policy simulations and the main decomposition principle. Levels of income poverty and inequality in a country result from a combination of population factors (including market income distribution and demographic composition) and redistributive policies (the impact of direct taxes, social contributions, transfers, etc.). Simulating the systems of countries A and B on the population of country B allows neutralizing the population factors so that the pure policy effects of both countries can be extracted and compared. We suggest a simple analytical framework based on such counterfactual simulations. We take as benchmark the most redistributive system, the South African one, and apply it to the five other countries. As previously argued, despite South Africa being one of the most unequal in the world, its redistributive system is more developed than in the other African countries under study. Alternatively, we also apply the least redistributive system in our pool of countries, the one of Mozambique, to the other

[6] The original idea of international platforms designed to simulate tax-benefit systems in a specific region (such as the EU or the African continent) was suggested by the pioneering work of Atkinson et al. (1988), who used national tax-benefit models to compare policy effects in France and the UK. This study inspired the development of the European microsimulation model EUROMOD, i.e. the first example of a common interface piloting harmonized microsimulation models allowing proper international comparisons. Very recently, this idea was transposed to the African context with the SOUTHMOD initiative, which gave birth to integrated tax-benefit microsimulation models for several developing countries including the six African countries studied here. The importance of building tax-benefit microsimulation models for developing countries was already highlighted by Atkinson and Bourguignon (1990), as such models should 'lead to a comprehensive, powerful and yet simple instrument for the design of an efficient redistribution system adapted to the specificity of developing countries'. The present paper follows this idea and provides one of the first comparative microsimulation studies for African countries.

countries. As highlighted in the introduction, the use of these polar cases is convenient and not driven by normative consideration. We could alternatively suggest 'policy swap' simulations for the 36 possible combinations (6 systems x 6 populations) but it would be rather cumbersome and the results difficult to interpret.

Note that our approach has traditionally been used to compare the same country between two points in time A and B, a period over which both the system and the underlying population have substantially changed (Bargain and Callan, 2010; Bargain, 2012). Yet it is also possible to use *across countries* rather than *over time*. In principle, we could consider any pair of system-population bundles to perform swap exercises embedded in the decomposition framework (see the broad discussion in Bargain, 2017). In a related touch, note that most of the research based on EUROMOD has consisted in applying specific policy instruments – if not the whole system – of a country A on a nearby country B. Examples of this kind of 'policy learning' experiments include swap simulations of unemployment benefit schemes in Belgium and the Netherlands (De Lathouwer, 1996) or of child and family benefits in France and the UK (Atkinson et al., 1988), Austria, Spain and the UK (Levy et al., 2007) or Baltic and Eastern European countries (Salanauskaite and Verbist, 2013). The present study is one of the first to perform a swap of *the whole system* between pairs of countries, as in the original ambition of Atkinson and Bourguignon (1990).[7]

3.2 Decomposition framework

We now suggest a formal presentation of the decomposition framework based on counterfactual simulations. Let us first introduce some notation and terminology. By household 'gross (or market) income', we mean the total amount of labour income, capital income and private pensions, before taxes and benefits. 'Disposable income' is the household income that remains after payment of taxes/social contributions and receipt of all cash transfers, as widely used to measure poverty and inequality. Let matrix y_c describe the population contained in the data of country c: for each household, it contains a stream of information about the household's market income sources, socio-demographic characteristics, etc. Let d_c denote the 'tax-benefit function' transforming, for each household, market/gross incomes and household characteristics into a certain level of disposable income. Tax-benefit calculations depend also on a set of monetary parameters p_c (including the maximum benefit amounts, the threshold level of tax brackets, etc.). Household disposable income is thus represented by $d_i(p_j, y_k)$ for a hypothetical scenario focusing on the population of country k, the tax-benefit parameters of country j and the tax-benefit structure of country i. A measure of inequality (e.g. the Gini) or poverty (e.g. the headcount ratio) can be calculated on the basis of the distribution of disposable income and is denoted $I[d_c]$.

[7] The other example we are aware of is the exercise conducted using models for Ecuador and Colombia (i.e. the ECUAMOD model described in Jara et al. 2019 and COLMOD presented in Rodriguez, 2019), whereby complete system swaps are suggested and analysed (see Bargain et al., 2017).

Given different currencies, we cannot directly apply the system of country 1 (including its monetary parameters like tax bands, benefit eligibility levels, etc.) on the market incomes of country 2. We must consider the possibility of nominally adjusting both monetary parameters and incomes by an uprating factor α.[8] Differences in gross income levels between country 1 and country 2 can be neutralized by a nominal adjustment using the indexation factor α defined as the mean gross income of country 2 divided by the mean gross income of country 1. As a result, αy_1 retains the market income *distribution* of country 1 but adopt the mean income *level* prevailing in country 2. Also, when evaluating the distribution obtained with the policy system of country 1 applied to the population of country 2, we can simulate counterfactual disposable incomes $d_1(\alpha p_1, y_2)$, whereby tax-benefit parameters are nominally adjusted to country 2's levels using the same factor α. Note that we apply a factor (i.e. mean income) which is not sensitive to the distribution to preserve the original distribution of market incomes in each country. This allows us to isolate the effect of tax benefit systems while accounting for differences in living standards.

With these notations, the total difference Δ in the welfare indicator I between country 1 and country 2 can be represented by:

$$\Delta = I[d_2(p_2, y_2)] - I[d_1(p_1, y_1)] \qquad (1$$

Next, the difference in the distribution of disposable income, as summarized by index I, can be decomposed into the contribution of the change in the tax-benefit rules ('policy effect') and the contribution of changes in the underlying gross income distribution (or any other effects not directly linked to policy changes). The former effect corresponds to a shift from $d_1(p_1, .)$ to $d_2(p_2, .)$ while the latter corresponds to the move from data of country 1, y_1, to data of country 2, y_2. Formally, this decomposition can be represented as:

$$\begin{aligned}\Delta = &\{I[d_2(p_2, y_2)] - I[d_1(\alpha p_1, y_2)]\} \text{ (tax-benefit policy effect)} \\ &+ \{I[d_1(\alpha p_1, y_2)] - I[d_1(\alpha p_1, \alpha y_1)]\} \text{ (other effects)} \\ &+ \{I[d_1(\alpha p_1, \alpha y_1)] - I[d_1(p_1, y_1)]\} \text{ (nominal adjustments).} \qquad (2)\end{aligned}$$

The third component in equation (2) should be zero ('nominal adjustments') as long as the tax-benefit function $d_c(p_c, y_c)$ is linearly homogenous in p_c and y_c, so that a simultaneous change in nominal levels of both incomes and parameters should not affect the relative location of households in the distribution of disposable income (Bargain and Callan, 2010). This is true when applying any factor α, for instance when converting national currency to dollars. We will rely on the final decomposition:

$$\Delta = \{I[d_2(p_2, y_2)] - I[d_1(\alpha p_1, y_2)]\} \text{ (tax-benefit policy effect)}$$

[8] The normalisation is applied on all income (all labour and non-labour income) since redistributive policies of a given country are usually based on its overall income distribution.

$$+ \{I[d_1(\alpha p_1, y_2)] - I[d_1(p_1, y_1)]\} \text{ (other effects).} \quad (3)$$

It consists of a shift from country 1 data to country 2 data conditional on the policy rules of country 1 ('other effects'), followed by a move from policy of country 1 to policy of country 2 based on country 2 data ('policy effect'). The 'other effects' include country differences in market income distribution but also comprise other population differences that may affect per capita (or equivalized) disposable income distribution, such as differences in demographic structures. The 'policy effect' isolates the direct role of country-specific tax-benefit regimes, i.e. our main focus.

At this stage, we need to highlight two limitations. First, we remark that another symmetrical decomposition could be performed to obtain the policy effect characterized by a change in policy (from 1 to 2) evaluated on the basis of (nominally adjusted) country 1 data, followed by a change in underlying data (from 1 to 2) conditional on the policy of country 2. We could not proceed in this way given that some of the `backward' swaps cannot be fully completed for some countries for which not all the policy instruments are simulated, as explained below.[9] Second, we could in principle simulate the policy system of every country in our sample on the data of any other country following the approach outlined above. However, simulating the 36 possible combinations would be cumbersome and results would be difficult to synthesize. We suggest a simpler design whereby the system of the most redistributive country, South Africa, is applied to the populations of all other countries (also, one whereby the system of one of the least redistributive country, Mozambique, is applied to the populations of all the other countries). A reason for this choice is also the limitation emphasized above. For these two countries, all the tax-benefit policies are simulated so that applying them to other countries can be done. Yet, for some other countries (notably Ethiopia), only part of the redistributive system is simulated so that it would not be possible to fully apply it to other countries.

3.3 Data and microsimulation models

Data. Our analysis is based on nationally representative household survey data from Ethiopia, Ghana, Mozambique, South Africa, Tanzania and Zambia. The datasets, listed in **Table 2**, contain detailed information on household and personal characteristics, employment, earnings and income from non-labour sources. Income concepts have been harmonized in all datasets with the aim to achieve comparability in the simulation results (see Gasior et al., 2018, for detailed explanations).

The key income component of interest in our analysis is gross market income, as it is the basis for the simulation of SIC and personal income tax payments and, in the case of South Africa, cash transfers. However, the data does not always contain information on gross market incomes. In

[9] Nevertheless, previous studies show very little path dependence on the way the decomposition is performed: results are not too sensitive to the underlying population used for the decomposition (see e.g. Bargain and Callan, 2011, and Bargain et al., 2017).

instances where net income (net of taxes and social contributions) is reported, gross income is imputed by reverse ruling based on the specific tax and social contribution rules of the country. This is the case in Mozambique and Tanzania, and for some observations in Ghana.

Table 2: Summary of Data Sources and Microsimulation Models

Country	Data Source	Year of Data Collection	# of individuals	# of households	Microsimulation Model	Policy Years simulated
South Africa	National Income Dynamics (NIDS)	2015	88,908	23,380	SAMOD	2014-2017
Mozambique	Inquérito ao Orcamento Familiar (IOF)	2015	109,119	21,879	MOZMOD	2015-2017
Zambia	Living Conditions Monitoring Survey (LCMS)	2015	62,879	12,251	MicroZAMOD	2010, 2015-2017
Ghana	Ghana Living Standards Survey (GLSS)	2013	72,372	16,772	GHAMOD	2013-2017
Ethiopia	Living Standards Measurement Study (LSMS)	2014	23,776	5,262	ETMOD	2014-2017
Tanzania	Household Budget Survey (HBS)	2012	46,593	10,186	TAZMOD	2012, 2015-2017

Sources: SOUTHMOD documentation and authors' simulation choices. Policy year simulated by the models indicated are all the available systems but our simulations focus on the year 2015 (difference between year of data collection and 2015 are accounted for by adjusting all incomes by appropriate uprating factors).

In general, informal employment is a salient feature of the countries under study. This potentially impacts our analysis as the simulations should account for non-compliance of SICs and direct taxes payments by individuals in informal employment. The datasets at hand do not allow a fully harmonized definition of informal employment across countries. The identification of informal workers relies on occupation types in most countries (e.g. self-employment is deemed informal while public sector is deemed formal) and additionally depends on information regarding whether the person holds a formal job entitlement (South Africa and Zambia) or work in a firm of less than 5 employees (Zambia and Ethiopia). **Table 3** reports the extent of informal employment across countries based on the data.

Table 3: Share of workers in informal employment

Country	Informal employment (%)
South Africa	17.4
Mozambique	79.2
Zambia	78.1
Ghana	53.8
Ethiopia	91.3
Tanzania	84.8

Source: Author's calculation based on SOUTHMOD microsimulation models' associated data: the South African National Income Dynamics Study (2014); the Mozambican Inquérito ao Orcamento Familiar (2008-9); Zambian Living Conditions Monitoring Survey (2010); the Ghana Living Standards Survey, version 6 (2012-13); the Ethiopian Living Standards Measurement Study (2013-14) and the Tanzanian Household Budget Survey (2011-12) data.

The share of informal employment is largest in Ethiopia and Tanzania while it is least in South Africa. Modest informality rates are observed in Ghana. The low share of informal employment in South Africa co-exists, however, with high levels of unemployment making South Africa's

situation somewhat unique compared to other African countries. This implies a small tax base and over reliance on social benefits in the country. In contrast, the high share of informal employment in other African countries is consistent with regional patterns: the informal sector employs 86 percent of workers in Africa (ILO, 2018). In our simulations, SIC and direct tax payments are simulated only for individuals in formal employment, as discussed in the following sections.

Tax-benefit microsimulation. Our study makes use of newly developed tax-benefit microsimulation models for African countries: GHAMOD (Ghana), MicroZAMOD (Zambia), MOZMOD (Mozambique), TAZMOD (Tanzania), ETMOD (Ethiopia) and SAMOD (South Africa). These models, listed in **Table 2**, combine detailed country-specific coded policy rules with cross-sectional micro-data in order to simulate direct taxes, social insurance contributions (SICs, assumed to be paid by formal sector workers only)and cash transfers for the household population. The last column of **Table 2** indicates all the policy years for which SOUTHMOD models can perform simulations. For an homogenous treatment, we focus in all countries on the 2015 tax-benefit systems for our analysis.[10] The tax-benefit microsimulations, designed as part of the SOUTHMOD project, have been implemented using the EUROMOD software, which enables users to analyse the effect of tax-benefit policies on the income distribution in a comparable manner across countries. All models are static in the sense that tax-benefit simulations abstract from behavioural reactions of individuals; we come back to this point below.

Scope of the simulations. Our analysis focuses on the concept of disposable income, as previously defined (market income after payment of taxes and contributions and receipt of cash benefits). Indirect taxes are not considered because simulation of such instruments has not been harmonized across countries, which prevents us from including them in the counterfactual simulations. Thus, we focus on *direct* taxation and transfers.

The microsimulation models systematically apply legislation rules to simulate tax-benefit instruments in each country. Levels of tax or benefit actually reported in the data are not used in the analysis, unless these instruments cannot be simulated due to a lack of information on key inputs in the simulations, such as gross incomes or relevant demographic variables (if this information makes it impossible to simulate a specific tax or benefit, then its amount is taken from the data and included as part of disposable income—a detail account of what is simulated and what is taken from the data is provided in **Table A.4**).

[10] In case the year of data collection of the survey at use does not match that policy year (e.g. Ethiopia, Tanzania and Ghana), market incomes and non-simulated tax-benefit variables in the data are adjusted to 2015 levels using source-specific updating factors. See Country Reports for more information, on www.wider.unu.edu/project/southmod-simulating-tax-and-benefit-policies-development.

As discussed earlier, employee SICs and PIT are simulated in all countries.[11] So are the main cash transfers, with some exception. First, cash transfers which require information about the degree of disability of individuals cannot be simulated due to lack of information in the input data of other countries. In particular, the South African Grant in Aid cannot be simulated as eligibility requires identifying individuals needing full-time care. Note that it represents only a small share of the total redistributive program of this country, so that ignoring it in our counterfactual simulations is not hugely detrimental to the analysis. Second, Ethiopia represents a particular case, in the sense that benefits could not be simulated for the 2015 policy year, due to the lack of specific eligibility information (notably for the Rural Productive Safety Net Programme), and are taken directly from the data for inclusion in disposable income. For this reason, the Ethiopian system cannot be applied to other countries for policy swaps.[12] Third, there are a few other exceptions. In particular, Ghana also shows limited applicability for the swap exercise since the simulation of benefits requires variables that do not exist in other countries (e.g. vulnerable children, pregnant women, attending public schools).

Baseline simulations and external sources. In the Appendix, **Table A.5** compares aggregate annual amounts of simulated SICs, taxes and benefits obtained with our simulations to external statistics (see SOUTHMOD country reports for more detail). In general, household survey data suffers from income underreporting and under-coverage of top incomes (Burkhauser et al., 2018), and such problems might be particularly prevalent in African countries, which rely more on consumption rather than income data. We would therefore expect an underestimation of simulated SICs and PIT revenue compared to external statistics. **Table A.5** confirms our expectations for all countries, except for Tanzania. The underestimation of PIT is particularly important in Ethiopia and Mozambique, whereas the simulations capture a large share of PIT revenue in Ghana and South Africa. The overestimation of PIT revenue in Tanzania is related to the lack of comparability between results from the simulations and the external benchmark. External figures in Tanzania are on a 'cash flow' basis whereas the model computes on an 'accrual' basis (Leyaro et al., 2019). Lack of external data on employee SICs revenue prevents a detailed validation of the simulations in all countries. However, as it was the case for PIT, we observed an important underestimation of employee SIC revenue in Ethiopia and in Mozambique for the case of private sector employee SICs, whereas the simulations match fairly well SIC revenue in Zambia and for public sector employees in Mozambique. In terms of benefits, aggregate expenditure is overestimated in South Africa, Mozambique and, particularly so, in Zambia, whereas it is underestimated in Tanzania. These deviations are mainly due to three factors: (i) the lack of comprehensive information in the household surveys to simulate in detail the eligibility

[11] In addition, self-employed SICs are levied in Mozambique and simulated; capital income tax is simulated in Ghana, and the Medical levy of Zambia has been included in MicroZAMOD.

[12] Note also that we consistently remove the non-simulated instruments from a country's disposable income simulations when the South African/Mozambique systems are applied to this country. In particular, when applying these systems on Ethiopian data, the South African/ Mozambican benefits are simulated and replace the Ethiopian benefit variables taken from the data when calculating disposable income.

conditions for entitlement; (ii) the assumptions of full national roll-out of these social programs; and (iii) the assumptions about full benefit take up, which we discuss in the next section.

Table A.6 reports baseline poverty and inequality results from the simulation for the six countries. Per capita income inequality, measured by the Gini coefficient, is extremely high in all countries. The poverty headcount based on the $1.9/day absolute line varies dramatically, with lower levels in countries like South Africa and Ghana and very high levels elsewhere. We also provide external statistics: they are not directly comparable since they rely on consumption expenditure data rather than income data. Many households do consume a lot more than actual reported income (and the fraction that is consumed is larger in poor households) because of the large extent of (i) household production in poor countries; (ii) unreported transfers (in the extended family or remittances from migrants'); and (iii) other sources of measurement errors on income (nonresponse, under-reporting, etc).

Few studies actually focus on income in the African context but when they do, distributional measures are more similar to our simulations. For instance, Lusambo (2016) reports a Gini above .70 for Tanzania and poverty rates close to ours.[13] Note that for poverty rates in **Table A.6**, income and consumption provide a similar country ranking: the correlation is .73 (and .98 without Ethiopia). The use of income allows for a more accurate simulation of tax policies and how they impact living standards, leading to an improved understanding of the redistributive capacity of the overall tax-benefit system of these countries. Yet, further work should attempt to model saving and self-production behaviour to modify disposable income simulations in the way that come closer to final household consumption.

3.4 Assumptions for Baseline and Counterfactual Simulations

Informal labour, Compliance and Benefit Take-up. We assume that all formal sector workers *comply* with stipulated SICs and personal income tax (PIT) rules. Both in the baseline and swap scenarios, we simulate PIT and contributions only for those formally employed. Arguably, the proportion of formal employees may change with major tax reforms, so that further work should attempt to model behavioural responses to a change in tax policies. Our simulations represent a first-order approximation, which may be reasonable in a context where sector choices are not so dependent on actual taxation. Using the same countries and tax-benefit microsimulation models, McKay et al. (2018) actually show that transitions between formal and informal sectors do not respond very strongly to tax-benefit policy variation over time and across countries. Regarding claiming behaviour, full benefit *take-up* is assumed in general, except in cases where claiming rates are actually low so that simulations deserve specific adjustments. An example of such

[13] Distributional measures based on income have only been used in the case of South Africa; none of the remaining five countries have constructed them, even though this information is now readily available in official survey data. The use of income data allows for a more accurate simulation of policies such as personal income tax and social insurance contributions, leading to an improved understanding of the redistributive capacity of the overall tax-benefit system of these countries.

adjustment is Mozambique, for which we calibrate the number of beneficiaries of the Direct Social Support Programme to match administrative data due to the major over-simulation of this benefit under the assumption of full take-up.

Targeting of beneficiaries. In the simulations, we take South Africa as the benchmark (most redistributive system) and apply its tax-benefit system to the five other countries. A key difference between the policies in South Africa and those in other African countries is that the South African benefits are means-tested against income, whereas cash transfers in other countries use proxy-means tests to detect eligibility. In practice, in many developing economies, means-testing might not be an administratively feasible option as income is difficult to observe due to high levels of informality and household production. However, proxy means-testing comes also with some disadvantages, as such schemes are also costly to administer and they might result in exclusion of poor households from the benefit or inclusion of non-poor households in the benefit programme (Brown et al., 2018). While we acknowledge that imposing the South African system on other countries assumes we can correctly identify low income individuals, the choice of applying the South African system is illustrative of the redistributive potential of a more developed tax-benefit system in the selected African countries. The essence of the simulation is to gauge the magnitude of the redistributive effects comprehensively taking into account both the tax and benefit components of the system. This choice also has the advantage of selecting an existing benchmark that is in force among countries under study. It is not suggested as a policy recommendation but as a means to understanding differences in tax-benefit rules in order to provide insights into potential pathways to redesign policies within a contextualised setting in each country.

4. Empirical results

This section presents the results of our comparative assessment of the redistributive role of tax-benefit systems in six African countries for the policy year 2015. We first discuss the baseline impact of national tax-benefit systems on poverty and inequality in each country, as well as a breakdown of income distribution effect by policy instrument. Then, we present the main results of our decomposition exercise to disentangle the role of tax-benefit policies in explaining differences in income poverty and inequality between countries. Finally, we discuss the contribution of particular policy instruments, within our decomposition framework, in reducing poverty and inequality.

4.1. Relative size of tax-benefit components

We start with a simple characterization of the total impact of tax-benefit systems on inequality and poverty in each country. **Table 4** compares the Gini coefficient and poverty headcount

measures for household disposable income and market household income.[14] Results are reported for per-capita measures. An absolute global poverty line based on the World Bank of $1.90 per day per person is applied on household PPP adjusted household income per capita.[15]

Results for South Africa indicate that inequality based on market income is 10.1 points higher than that based on disposable income. This suggests that the South African tax-benefit system tends to have some equalizing effect. To a lesser extent, the Gini is also reduced in Ethiopia and Tanzania. These effects are small, a reduction of 3-4 points, but not necessarily much smaller than in other developing regions of the world. On average, tax-benefit systems in Latin America decrease the Gini coefficient by 2.7 points (from 50.8 to 48.1), according to Lustig (2017) for the year 2011. Admittedly, a lot more redistribution is operated in rich countries: the Gini coefficient for the EU28 falls from 50.1 to 29.2 on average when market income is compared to disposable income.[16]

Table 4: Effect of tax-benefit systems on income inequality and poverty

	Inequality (Gini coefficient %)			Poverty (FGT0%)*		
	Disposable income	Market income	Difference	Disposable income	Market income	Difference
South Africa	63.4	73.5	-10.1	13.1	35.2	-22.1
Mozambique	81.8	82.3	-0.4	84.0	83.1	0.9
Zambia	74.7	76.4	-1.8	70.5	69.9	0.6
Ghana	71.0	71.3	-0.3	31.0	30.6	0.4
Ethiopia	84.1	87.9	-3.8	85.5	85.2	0.2
Tanzania	80.5	83.2	-2.7	72.6	72.5	0.1

Notes: * Poverty line = $1.90 per day per person. Source: authors' simulations based on Southmod microsimulation models and associated data: the South African National Income Dynamics Study (2014); the Mozambican Inquérito ao Orcamento Familiar (2008-9); the Zambian Living Conditions Monitoring Survey (2010); the Ghana Living Standards Survey, version 6 (2012-13); Ethiopian Living Standards Measurement Study (2013-14) and the Tanzanian Household Budget Survey (2011-12) data.

Interestingly, a much larger redistributive effect is registered in South Africa when it comes to the incidence of poverty. It is reduced by 22.1 points, especially thanks to a generous social assistance support that reaches a third of its population. The redistributive systems of other countries are not as developed and have much less impact on poverty. In fact, in line with past studies based on incidence methods, they actually tend to increase poverty. South Africa has the most redistributive system in terms of inequality. This finding is consistent with Inchauste et al. (2015) who show that South Africa fared better in reducing income inequality compared to most African countries and also compared to several Latin American countries (Brazil, Mexico, Bolivia,

[14] See also Gasior et al. (2018) for a complete characterization of the distributional impact of the socio-fiscal systems of the countries under study.
[15] National equivalence scales are not used to allow for comparability across countries. Results based on OECD equivalised household income are available upon request from the authors.
[16] See EUROMOD statistics accessed at www.euromod.ac.uk/using-euromod/statistics.

Costa Rica, Guatemala, Peru, Uruguay, El, Salvador), Indonesia, and Armenia.[17] Ghana and Mozambique have the least redistributive systems in terms of Gini reduction while the Mozambican system has the most anti-redistributive effect regarding poverty.

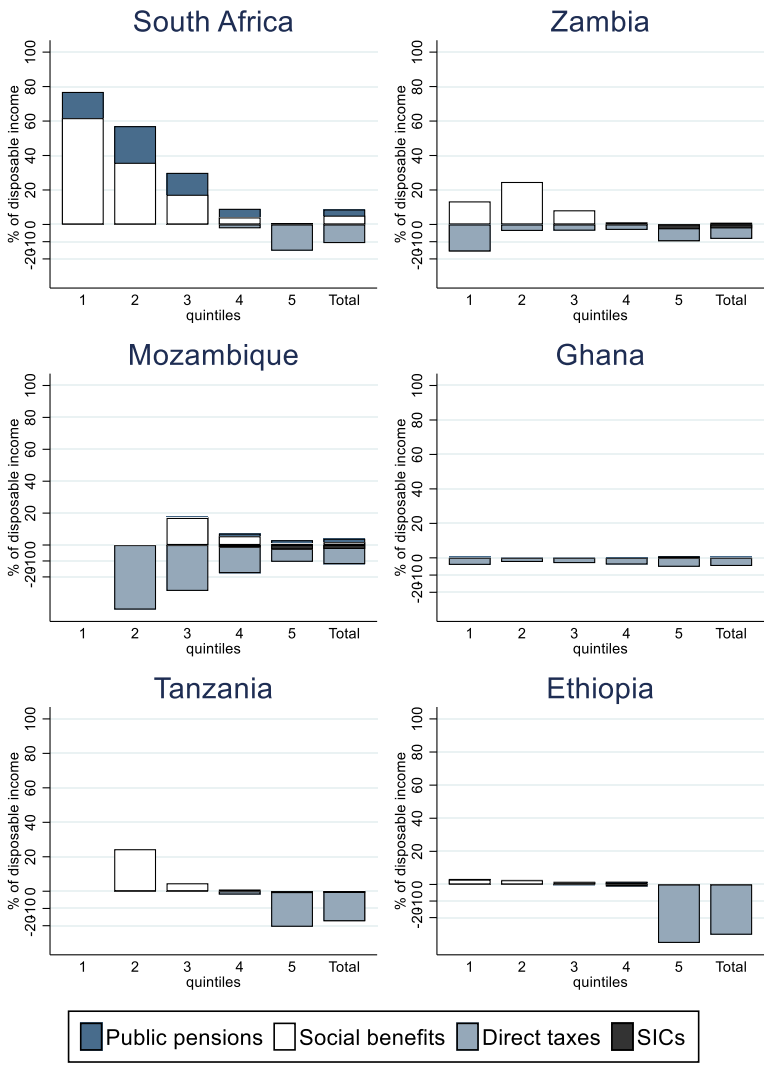
Our results indicate that the effect of applying existing tax-benefit rules results in a marginal increase in poverty, with the exception of South Africa. As discussed previously, our simulations assume full compliance with SICs and tax payments for all workers in formal employment. However, it is possible that some of those identified as formal workers (in particular low earners) might effectively not pay taxes in which case the negative effect of taxes on poverty might be lower or nil. In practice, discretionary enforcement of tax rules could mitigate such regressive effects. However, from the backgrounds of the countries under study, there is no evidence of discretionary enforcement of taxation. In any case, our results are in line with fiscal incidence analyses for Zambia, Tanzania and Ghana, which show an increase in headcount poverty after taxes and state transfers are taken into account (Higgins and Lustig, 2016; Lustig, 2017; de la Fuente et al., 2017).

It is important to note that although the levels of income poverty and inequality obtained in our analysis differ from those based on consumption, our results on the effect of tax-benefit systems on inequality and poverty are in line with those of studies using the CEQ methodology (incidence-based). Therefore, there seems to be a broad consistency between the approaches used to calculate the incidence of taxes and benefits. The main difference lies on the concept used as starting point to derive disposable income: gross market income in our case, whereas CEQ methodology assumes disposable income equal to consumption (except in South Africa).

Figure 1 shows the relative size of tax-benefit components (i.e. public pensions, social benefits, direct taxes and SICs) in each country. The average size of each income component is measured as a percentage of average household disposable income by household disposable income quintile, and on average for the whole population (Total). Direct taxes, and SICs are shown as negative values as they are subtracted in the calculation of disposable income. We see that social benefits clearly explain the larger redistribution at low income levels in South Africa. Taxation is progressive in this country as well as in Tanzania and Ethiopia but regressive in Zambia and Mozambique. Ghana shows very limited impact of tax-benefit instruments on income at every point of the distribution.

[17] Its 2010 Gini coefficient for market income decreased by 18 points when considering final income encompassing taxes and government spending. This reduction is higher compared to other middle income and African countries (the Gini decreased by 14 points in Brazil, 8 points in Mexico and 2.3 points in Ethiopia). Direct taxes and cash transfers also reduced the level of poverty in South Africa from 52.3% to 45.1%.

Figure 1: Tax-benefit components as a share of household disposable income by income quintile in 2015



Source: Authors' calculations using SOUTHMOD microsimulation models.

4.2. Decomposition results

We move to our decomposition analysis. It aims to quantify the contribution of tax-benefit policies to differences in income inequality and poverty between countries. For that purpose, we use the most redistributive tax-benefit system, i.e. South Africa, as a benchmark for all the other systems.

The results of our decomposition analysis are presented in **Table 5.** In rows, we indicate the series of inequality and poverty indices that are used as the main distributional outputs. All these measures are based on per capita household disposable incomes. For inequality, we focus on the Gini index and the Atkinson index with two levels of inequality aversion. Absolute poverty is measured using a poverty line of USD 1.90 PPP per day. We report the poverty headcount (FGT0),

the poverty gap (FGT1) and the poverty severity (FGT2). In column, we report the different simulations used in our decomposition.

Column (1) in **Table 5** gives the baseline situation for the reference country, South Africa (SA), for instance a Gini of 63.4 using per capita disposable incomes. The different columns (2) report the baselines for each of the other countries: Mozambique (MZ), Zambia (ZM), Ghana (GH), Ethiopia (ET) and Tanzania (TZ), for instance a Gini of 81.8 for MZ. Then, column (2') reports for each country the counterfactual situation where all incomes (in the data) and all tax-benefit monetary parameters (in the tax-benefit simulations) are uprated to South African levels. Uprating factors (captured by the parameter α in the equations above) are calculated as the ratio of mean gross incomes between South African and each of the other countries. We confirm that tax-benefit systems in the countries under analysis respect the homogeneity property: (2) and (2') are equal for all indices, which means that the difference between two countries (for instance SA and MZ) can be decomposed in two components (the tax-benefit policy effect and the other effects).

The column labelled (C) shows our main counterfactual scenario whereby the South African system is applied to the population of other countries, after nominal adjustments of market incomes to South African levels as in the intermediary step (2'). We see for instance that if the South African tax-benefit system was applied to Mozambique, inequality as measured by the Gini coefficient would decrease from 81.8 (Mozambican baseline) to 66.6 (the Mozambican counterfactual based on the South Africa system). The overall difference in inequality/poverty between the reference country (South Africa) and the target country (Mozambique) is also indicated as (2)-(1), for instance 18.4 regarding Gini indices. Finally, the two components of the decomposition are reported: the policy effect and other effects, indicated as (2)-(C) and (C)-(1) respectively.[18] In the case of Mozambique, we see that the policy effect is responsible for 83% of the better performances of South Africa in terms of inequality (15.3 points out of the total Gini difference of 18.4 points). In a similar way, the poverty rate of Mozambique would be 81.8% if the South African tax-benefit system was in place in this country rather than 84% in the baseline, i.e. a policy effect of 2.2 points (3.1% of the country difference).

As seen in **Table 5**, exporting the South African system would eliminate most of the gap in Gini coefficients with the other countries except Ghana (where it would reduce the Gini by 3.3 points, i.e. 43% of the existing difference). Note that these results are not only due to the progressive effect of the South African system: it also reflects varying degree of redistribution across the tax systems of the other countries. Decomposition results based on Atkinson indices show an equally pronounced effect. Especially when inequality aversion is higher, tax-benefit policies explain

[18] For the interpretation, bear in mind that the 'other effects' include all the factors not related to tax-benefit policies as simulated in our exercises, and notably differences in market income inequality and in demographics. They also comprise country differences in non-simulated tax-benefit components, such as contributory pensions. The policy effect only captures differences in social assistance benefits, personal income tax and social insurance contributions between countries.

most of the differences between South Africa and other countries (again, with the exception of Ghana: half of the difference is explained by the policy effect in this case).

Regarding poverty, baseline results have shown that income poverty is lower in South Africa than in all the other countries under study. Nonetheless, the decomposition table indicates that most of the gap in terms of poverty headcount between South Africa and other countries is driven by the `other effects', i.e. market income distributions and demographic compositions of these countries explain most of the difference in population density below the per capita poverty line. The differences in socio-fiscal policies explain only 1.3 points (1.8%) of the gap with Ethiopia, 2.2 points (3.1%) with Mozambique and 6.7 points (11.6%) with Zambia; there is a more substantial policy effect when compared with Ghana and Tanzania: the South African system closes 7.9 and 17.8 points (43.7% and 29.8%) of the poverty differentials with these countries respectively. The policy contribution becomes more significant when looking at the intensity of poverty. With FGT1, the role of tax-benefit policies amounts to 20.2% of the total gap with Mozambique and up to 57.6% with Ghana and 60% with Tanzania.

Variations in redistributive effects from exporting the South African system to other countries lie in differences in coverage of South African policies across countries potentially due to differences in the distribution of market incomes and demographic composition. Market income inequality is higher in other countries, except Ghana, than in South Africa (see Table 4). This means that there might be a larger share of the population entitled to means-tested benefits when the South African system is applied to other countries, compared to the South African baseline. In terms of demographic composition, the share of children in households with low income might be larger in other countries compared to South Africa, which would result in a larger number of beneficiaries and a higher expenditure in Child Support Grant.

Table 5. Decomposing differences in the income distribution between countries (reference: South Africa, SA)

data country:	SA	MZ	MZ	MZ		Decomposition		ZM	ZM	ZM		Decomposition		GH	GH	GH		Decomposition		ET	ET	ET		Decomposition		TZ	TZ	TZ		Decomposition	
uprated to:			SA	SA	Total diff.	Tax-ben. policy effect	Other effect		SA	SA	Total diff.	Tax-ben. policy effect	Other effect		SA	SA	Total diff.	Tax-ben. policy effect	Other effect		SA	SA	Total diff.	Tax-ben. policy effect	Other effect		SA	SA	Total diff.	Tax-ben. policy effect	Other effect
policy country:	SA	MZ	MZ	SA				ZM	ZM	SA				GH	GH	SA				ET	ET	SA				TZ	TZ	SA			
uprated to:			SA						SA						SA						SA						SA			
	(1)	(2)	(2')	(C)	(2)-(1)	(2)-(C)	(C)-(1)	(2)	(2')	(C)	(2)-(1)	(2)-(C)	(C)-(1)	(2)	(2')	(C)	(2)-(1)	(2)-(C)	(C)-(1)	(2)	(2')	(C)	(2)-(1)	(2)-(C)	(C)-(1)	(2)	(2')	(C)	(2)-(1)	(2)-(C)	(C)-(1)
Inequality																															
Gini	63.4	81.8	81.8	66.6	18.4	15.3	3.1	74.7	74.7	62.3	11.2	12.4	-1.1	71.0	71.0	67.7	7.6	3.3	4.3	84.1	84.1	64.7	20.7	19.3	1.3	80.5	80.5	65.7	17.1	14.9	2.2
Atkinson 0.5	32.5	45.2	45.2	36.6	12.7	8.7	4.0	43.3	43.3	31.3	10.7	12.0	-1.2	41.9	41.9	39.2	9.4	2.7	6.7	69.2	69.2	46.6	36.7	22.6	14.1	51.5	51.5	37.5	18.9	14.0	4.9
Atkinson 1	53.9	71.3	71.3	55.5	17.4	15.8	1.6	72.8	72.8	50.9	18.9	21.9	-3.0	64.7	64.7	59.4	10.8	5.4	5.5	79.4	79.4	54.6	25.5	24.9	0.6	76.8	76.8	54.2	22.9	22.6	0.3
*Poverty**																															
FGT0 (%)	13.1	84.0	84.0	81.8	71.0	2.2	68.8	70.5	70.5	63.8	57.4	6.7	50.7	31.0	31.0	23.2	18.0	7.9	10.1	85.5	85.5	84.1	72.4	1.3	71.1	72.6	72.6	54.9	59.6	17.8	41.8
FGT1 (%)	4.6	69.6	69.6	56.4	64.9	13.1	51.8	52.9	52.9	34.9	48.2	18.0	30.2	18.0	18.0	10.3	13.4	7.7	5.7	57.1	57.1	42.4	52.5	14.7	37.8	55.1	55.1	24.9	50.5	30.2	20.2
FGT2 (%)	2.4	63.0	63.0	43.9	60.6	19.1	41.5	44.7	44.7	22.6	42.3	22.2	20.2	13.7	13.7	6.3	11.3	7.4	4.0	43.3	43.3	24.9	40.9	18.4	22.5	46.9	46.9	14.2	44.5	32.7	11.9

Notes: South Africa=SA; Mozambique=MZ; Zambia=ZM; Ghana = GH; Ethiopia=ET; Tanzania=TZ. Policy year 2015. Source: Author's calculation based on SOUTHMOD microsimulation models and associated data: the South African National Income Dynamics Study (2014); the Mozambican Inquérito ao Orcamento Familiar (2008-9); Zambian Living Conditions Monitoring Survey (2010); the Ghana Living Standards Survey, version 6 (2012-13); the Ethiopian Living Standards Measurement Study (2013-14) and the Tanzanian Household Budget Survey (2011-12) data.

* Poverty line = $1.90 per day per person

4.3. Marginal contributions of tax-benefit components and interpretations

To better understand these effects, we suggest zooming on the effect of particular tax-benefit instruments (social benefits, income tax and social contributions). Following the same decomposition logic, we characterize how the effect of each instrument on inequality and poverty changes under our counterfactual scenarios. Results are reported in **Table 6** when using South Africa as benchmark. For social benefits, taxes and contributions respectively, we calculate their marginal contribution to inequality or poverty measures (summarized by the Gini coefficient and the headcount poverty, respectively). For instance, every figure in the first row is calculated as the Gini based on disposable incomes and the Gini based on disposable income before addition of social benefits. In **Table 6**, for the South African baseline (1), these figures are respectively 63.4 % and 71.4%, i.e. social benefits contribute to a decrease of 8 points of the Gini index. The second row shows that withdrawing income taxes from household budgets contributes to a reduction of 2.7 points of the South African Gini index. The second column, (2), shows that in Mozambique, social benefits decrease the Gini by only 1 point while taxation *increases* the Gini by 0.6 points (this regressive effect was previously observed in **Figure 1**). When applying the South African system to Mozambique, the counterfactual scenario points to a strong equalitarian effect of the South African social benefits (the Gini decreases by 14 points, i.e. more than in South Africa itself) as well as an equalitarian effect of taxation (the Gini decreases by 2.8 points, i.e. a similar performance as what the South African tax system accomplishes in South Africa). Social contributions have very little effect in general. Overall, **Table 6** indicates that the strong impact of the South African system on the Gini of Mozambique, Zambia, Tanzania and especially Ethiopia is due to the redistributive power of the South African social benefit system (relatively to other countries' social benefit schemes) and, to a much lesser extent, to the South African tax system. South African policies, both social benefits and taxes, have a more modest effect in Ghana, hence the aforementioned result of a lower Gini reduction in this country.

Turning to poverty, we see in **Table 6** that social benefits are what radically diminish the poverty count in South Africa (22.2 points). Similarly, the poverty reduction induced by the South African system exported to other countries is entirely due to its social benefit policies (not to taxation or contributions). The effects reported in **Table 5** regarding poverty are broadly consistent with the impact of the South African social benefits as observed in **Table 6**: the impact is not sufficient to alleviate poverty much in Mozambique (1.6 point); it is moderate in Zambia and Ethiopia; it is largest in Ghana and Tanzania: South African social benefits would reduce poverty by 7.5 and 17.7 points in these countries, respectively.

Table 6: Effect of tax-benefit components on poverty and inequality (ref.: South Africa)

data country:	SA	MZ	MZ	MZ	ZM	ZM	ZM	GH	GH	GH	ET	ET	ET	TZ	TZ	TZ
uprated to:			SA	SA		SA	SA		SA	SA		SA	SA		SA	SA
policy country:	SA	MZ	MZ	SA	ZM	ZM	SA	GH	GH	SA	ET	ET	SA	TZ	TZ	SA
uprated to:			SA			SA			SA			SA			SA	
	(1)	(2)	(2')	(C)	(2)	(2')	(C)	(2)	(2')	(C)	(2)	(2')	(C)	(2)	(2')	(C)
Δ *Gini Coefficient*																
disp. income - social benefits	-8.0	-1.0	-1.0	-14.0	-1.0	-1.0	-12.4	0.1	0.1	-3.0	-0.3	-0.3	-18.5	-0.60	-0.60	-16.7
disp. income + income tax	-2.7	0.6	0.6	-2.8	-0.6	-0.6	-2.5	-0.3	-0.3	-0.7	-3.6	-3.6	-7.1	-2.1	-2.1	-1.4
disp. income + social contributions	0.0	-0.2	-0.2	0.0	-0.3	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0
Δ *Poverty headcount**																
disp. income - social benefits	-22.2	-0.5	-0.5	-1.6	-0.1	-0.1	-6.2	-0.1	-0.1	-7.5	-0.2	-0.2	-6.9	-0.1	-0.1	-17.7
disp. income + income tax	0.0	1.3	1.3	0.3	0.6	0.6	0.0	0.4	0.4	0.0	0.4	0.4	0.0	0.2	0.2	0.0
disp. income + social contributions	0.0	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0

Notes: South Africa=SA; Mozambique=MZ; Zambia=ZM; Ghana = GH; Ethiopia=ET; Tanzania=TZ. Policy year 2015. * Poverty line = $1.90 per day per person. Source: Author's calculation based on SOUTHMOD microsimulation models and associated data: the South African National Income Dynamics Study (2014); the Mozambican Inquérito ao Orcamento Familiar (2008-9); Zambian Living Conditions Monitoring Survey (2010); the Ghana Living Standards Survey, version 6 (2012-13); the Ethiopian Living Standards Measurement Study (2013-14) and the Tanzanian Household Budget Survey (2011-12) data.

From the set of results above, we suggest some interpretations about the larger 'policy effects' on inequality relative to poverty. It is likely due to the joint effect of South African social benefits and income tax, as both are contributing to the reduction in inequality – even if the contribution on the side of social benefits is much larger. Both marginal contributions, shown in **Table 6**, contribute to inequality reduction by positively affecting both tails of the distribution. The smaller 'policy effects' for poverty are related, to some extent, to the fact that only social benefits are contributing to poverty reduction, and their effect is relatively smaller than that on inequality (cf. **Table 6**). 'Other effects' might mostly be capturing differences in market incomes and the fact that in some countries many observations have zero or low earnings. Following the South African swap, incomes at the bottom of the distribution in other countries are positively affected by the social benefits from South Africa. However, benefit amounts are nominally adjusted to standards of living in each country meaning that the amounts in some cases might not result in lifting some individuals above the poverty line, resulting in a smaller 'policy effect' for poverty.

4.4. Budgetary implications of importing the South African system

The aim of our decomposition exercise is to quantify the contribution of differences in the design of tax-benefit policies to differences in poverty and inequality across countries, rather than suggesting the adoption of a particular system by other countries. As such, the benchmark South African tax-benefit rules have been applied as they are to other countries' populations (after an adjustment to countries' specific standard of living). This is done within a static framework which does not account for behavioural responses, general equilibrium and intertemporal effects of the system swap, nor for additional reforms that would guarantee budget neutrality. To give a sense of what it would entail to have a more developed system, **Table 7** shows the budgetary implications of exporting the South African system as an example (not a prescription).

Exporting the South African system to other countries – even after adjustment to local living standards – can be costly in terms of net tax revenue, i.e. the difference between total tax/contribution collection and transfer payments. The net revenue would indeed increase by almost 100% in Ghana and Ethiopia, 160-180% in Mozambique and Zambia, and up to 240% in Tanzania. If we compare this extra cost with the number of persons alleviated from poverty thanks to the policy change, the cost effectiveness is the highest in Zambia, Ghana, and Tanzania (less than 20 PPP USD per person taken out of poverty). It is substantially lower in Ethiopia, as this cost would be as high as 212 PPP USD. There are a number of interrelated factors that explain the differences in cost per alleviated poor, such as the differences in the distributions of gross market income, demographic characteristics and the design of tax-benefit policies. For instance, gross market income inequality and poverty is particularly high in Ethiopia (Table 4). In this country, it might be more difficult to lift people from poverty, especially if they are far below the poverty line. This is somewhat what we observe in Table 5, the effect of the South African system on the poverty headcount is very small in Ethiopia. However, we observe a larger effect in the poverty gap meaning that the South African system is providing additional means (at larger cost than the baseline system) but unable to lift many people above the poverty line. The situation is similar in Mozambique. Differences in demographic characteristics and design of tax-benefit policies also play a role. For instance, the SA Child Support Grant would have a larger effect in reducing poverty in countries with larger shares of households with children at the bottom of the distribution. In that case, the SA system would also be more cost effective with additional expenditure in benefits contributing to a larger reduction in poverty and inequality. Overall, the budgetary effects uncovered here suggest that improving tax-benefit systems should be considered as part of a broader economic development programme. This would require adequate resource mobilisation to finance the improvements such as building administrative capacity necessary for more developed systems.

Table 7. Budgetary effects of importing the South African system

	MZ	ZM	GH	ET	TZ
Change in net tax revenue	-184%	-168%	-97%	-98%	-240%
Cost per alleviated poor (PPP USD)	-30.9	-17.4	-19.3	-212.1	-19.8

Notes: Net tax revenue is aggregated taxes and social contributions minus transfers. The cost-efficiency in poverty reduction is calculated as the change in state budget required per person taken out of poverty (Poverty line = $1.90 per day per person). South Africa=SA; Mozambique=MZ; Zambia=ZM; Ghana = GH; Ethiopia=ET; Tanzania=TZ. Policy year 2015. Source: Author's calculation based on SOUTHMOD microsimulation models and associated data: the South African National Income Dynamics Study (2014); the Mozambican Inquérito ao Orcamento Familiar (2008-9); Zambian Living Conditions Monitoring Survey (2010); the Ghana Living Standards Survey, version 6 (2012-13); the Ethiopian Living Standards Measurement Study (2013-14) and the Tanzanian Household Budget Survey (2011-12) data.

Our results leave room open for discussion about potential pathways to strengthen social protection in African countries and how to finance more redistributive policies. The South African benchmark, even adjusted to local living standards, would have an important effect in poverty and inequality reduction but at a high cost in countries which are already under budgetary pressure. Despite the gains from moving to a more progressive income tax system, under the

South African rules, net tax revenue increases substantially in all countries pointing to the need of combining direct and indirect tax reforms to finance the expansion of social cash transfers. Our analysis did not consider the role of indirect taxes due to lack of comparability in the data and simulations across countries for this instrument. However, progressive reforms to indirect taxes should be considered as a mechanism to finance social programs, at least in the short run, given the presence of a large informal sector which limits the impact of direct taxation.

4.5. An alternative benchmark: importing the Mozambican system

In order to highlight the role of policies and population characteristics in explaining differences in poverty and inequality across countries, we present results of a decomposition analysis using Mozambique – one of the least redistributive systems – as an alternative benchmark. Contrary to the South African benchmark, we would expect the effect of differences in policies to play a smaller role when the Mozambican tax-benefit rules are applied to other countries (except South Africa). **Table 8** presents the decomposition results.

Consistent with the decomposition results using South Africa as a benchmark, the alternative counterfactuals using Mozambique as the reference system show that applying Mozambican policies in South Africa would increase the Gini by more than 9 points and increase poverty by 22 points. In all other countries, the effect of Mozambican tax-benefit rules in more limited. In Ghana and Zambia, policy effects are almost null: most of the difference with Mozambique is due to other factors, while the tax and benefit systems in Mozambique are equally modest as in these countries, so that the policy swap does not alter income distribution measures much. In Tanzania, applying the socio-fiscal policies of Mozambique deteriorate inequality indices.

Table A.7 in the Appendix reports the marginal contributions of social benefits, taxes and social insurance contributions to inequality and poverty measures, when Mozambique is used as an alternative backdrop. The results show that the social assistance scheme in force in Mozambique has a minor effect on the Gini (-1 point) and on poverty (-0.5 point) but would have hardly any effect on the inequality and poverty of other countries in our sample. In South Africa, it would annihilate the strong redistributive effect of the system in place, i.e. the 22 points reduction in poverty and the 8 points reduction in inequality. In Ethiopia and Tanzania, it would not do worse than the existing systems: it would equally reduce inequality and poverty by a small margin.

The income tax scheme in Mozambique has a regressive effect, increasing the Gini by 0.6 point and poverty by 1.3 point. This anti-redistributive effect is partly conveyed to Zambia (especially in terms of poverty). In other countries, it has at best hardly any effect on inequality and poverty; or it generates a tiny redistributive effect that is not as good as the national system (obviously in South Africa, but also in Tanzania with a reduction in Gini of 2.1 points with the Tanzanian system and of 0.3 point only with the Mozambican policy). Only in Ethiopia does it reduce the Gini by a similar margin as the system in place (-3.4 points).

Table 8. Decomposing differences in the income distribution between countries (reference: Mozambique, MZ)

data country:	MZ	ZM	ZM	ZM		Decomposition		SA	SA	SA		Decomposition		GH	GH	GH		Decomposition		ET	ET	ET		Decomposition		TZ	TZ	TZ		Decomposition	
uprated to:			MZ	MZ	Total diff.	Tax-ben. policy effect	Other effect		MZ	MZ	Total diff.	Tax-ben. policy effect	Other effect		MZ	MZ	Total diff.	Tax-ben. policy effect	Other effect		MZ	MZ	Total diff.	Tax-ben. policy effect	Other effect		MZ	MZ	Total diff.	Tax-ben. policy effect	Other effect
policy country:	MZ	ZM	ZM	MZ				SA	SA	MZ				GH	GH	MZ				ET	ET	MZ				TZ	TZ	MZ			
uprated to:			MZ						MZ						MZ						MZ						MZ				
	(1)	(2)	(2')	(C)	(2)-(1)	(2)-(C)	(C)-(1)	(2)	(2')	(C)	(2)-(1)	(2)-(C)	(C)-(1)	(2)	(2')	(C)	(2)-(1)	(2)-(C)	(C)-(1)	(2)	(2')	(C)	(2)-(1)	(2)-(C)	(C)-(1)	(2)	(2')	(C)	(2)-(1)	(2)-(C)	(C)-(1)
Inequality																															
Gini	81.8	74.7	74.7	76.2	-7.2	-1.6	-5.6	63.4	63.4	72.9	-18.4	-9.4	-9.0	71.0	71.0	71.0	-10.8	0.0	-10.8	84.1	84.1	83.2	2.2	0.9	1.3	80.5	80.5	82.2	-1.3	-1.7	0.4
Atkinson 0.5	45.2	43.3	43.3	44.6	-1.9	-1.3	-0.7	32.5	32.5	39.0	-12.7	-6.4	-6.2	41.9	41.9	42.0	-3.3	-0.1	-3.2	69.2	69.2	66.8	24.0	2.4	21.6	51.5	51.5	54.0	6.2	-2.5	8.7
Atkinson 1	71.3	72.8	72.8	75.2	1.5	-2.4	3.9	53.9	53.9	66.8	-17.4	-12.9	-4.5	64.7	64.7	64.9	-6.6	-0.2	-6.4	79.4	79.4	78.4	8.1	1.1	7.0	76.8	76.8	79.2	5.5	-2.4	7.9
Poverty*																															
FGT0 (%)	84.0	70.5	70.5	70.5	-13.6	0.0	-13.6	13.1	13.1	35.0	-71.0	-22.0	-49.0	31.0	31.0	30.8	-53.0	0.3	-53.3	85.5	85.5	83.0	1.4	2.5	-1.1	72.6	72.6	72.1	-11.4	0.5	-11.9
FGT1 (%)	69.6	52.9	52.9	54.0	-16.7	-1.1	-15.6	4.6	4.6	26.2	-64.9	-21.6	-43.3	18.0	18.0	17.8	-51.5	0.2	-51.8	57.1	57.1	54.6	-12.5	2.5	-15.0	55.1	55.1	54.7	-14.5	0.4	-14.9
FGT2 (%)	63.0	44.7	44.7	46.4	-18.2	-1.7	-16.6	2.4	2.4	22.9	-60.6	-20.5	-40.0	13.7	13.7	13.4	-49.2	0.3	-49.5	43.3	43.3	41.2	-19.6	2.1	-21.7	46.9	46.9	46.9	-16.0	0.1	-16.1

Notes: South Africa=SA; Mozambique=MZ; Zambia=ZM; Ghana = GH; Ethiopia=ET; Tanzania=TZ. Policy year 2015. Source: Author's calculation based on SOUTHMOD microsimulation models and associated data: the South African National Income Dynamics Study (2014); the Mozambican Inquérito ao Orcamento Familiar (2008-9); Zambian Living Conditions Monitoring Survey (2010); the Ghana Living Standards Survey, version 6 (2012-13); the Ethiopian Living Standards Measurement Study (2013-14) and the Tanzanian Household Budget Survey (2011-12) data.

* Poverty line = $1.90 per day per person

5. Conclusion

The emergence of social systems in Africa must face the double challenge of expanding the domestic tax base and performing a degree of redistribution that could alleviate poverty and reduce the considerable extent of income inequality. Exploiting newly developed microsimulation models for six African countries, we characterize the redistributive potential of their tax-benefit systems. Our main innovation consists of counterfactual simulations aimed to elicit the degree of extra redistribution induced by transposing the 'best' system (that of South Africa) to all the other countries. These simulations are embedded in a decomposition framework that allows quantifying the contribution of the policy swap compared to other differences (market income distributions, demographic compositions, etc.) between South Africa and the other countries.

Our results show that part of the inequality gap between South Africa and the other countries – and, to a less extent, part of the poverty gap –is explained by differences in tax-benefit policies. The gap fades away by exporting the South African system, in particular due to its relatively more generous social benefits, but at a high cost in all countries. Net tax revenue increases substantially under the South African system despite potential gains from moving to a more progressive income tax system, which is most likely related to the presence of a large informal sector in the economy of the importing countries.

Our analysis raises a number of relevant policy considerations and highlights the needs for future research. *First*, our benchmarking exercise highlights the extent to which progressive tax-benefit policies can reduce inequality and poverty. The choice of South Africa as a reference system is not suggested as a policy recommendation but as a means to understanding differences in tax-benefit rules in order to redesign policies within a contextualised setting in each country. *Second*, sustainable welfare reforms would require not only progressive tax reforms but also inclusive growth, formalization policies and investment in stronger institutions to ensure enforcement of tax systems. *Third*, improving microsimulations with the addition of indirect taxes and in-kind benefits seems important in order to extend our analysis to a more general setting. This was beyond the scope of the present work. *Fourth*, data collection should focus on improving income information in household surveys. This would not only allow providing a more accurate picture of living standards across countries but also increase the potential of microsimulation models as tools for policy analysis.[19] *Finally*, our paper captures only the 'next-day' effect of swapping tax-benefit rules in the decomposition. That is, we characterize the redistribution that can be

[19] Our calculation are based on income data, which departs from the tendency to use consumption data for poverty and inequality calculations in poor countries (World Bank, 2016). However, the use of income data allows a more accurate simulation of policies such as personal income tax and social insurance contributions, leading to an improved understanding of the redistributive capacity of the overall tax–benefit system of these countries and a starting point for evidence-based policy making. Further studies are under way that focus on the quality of the income data and options for strengthening their quality in some of these countries (e.g. McLennan et al. 2019; Wright et al. 2019). While there are challenges inherent in analysing income data, it is recognized that consumption data can also be problematic in terms of measurement error and comparability (e.g. Beegle et al. 2016; Gibson et al. 2015), and so further work should combine both approaches.

operated by means of exporting the 'best' regional socio-fiscal system while assuming that market incomes would remain fixed in that case. Yet, potential behavioural responses or general equilibrium effects of performing such a substantial tax-benefit reform should be considered in the future. In particular, given the extremely large share of informal employment in the African context, even a small response to tax reforms in terms of transition between formal and informal employment may have significant redistributive consequences. That is, a change in socio-fiscal policies due to a policy swap may change the tax base and affect the distributional impact of the simulated reform. To perform behavioural simulations, estimates of the tax-elasticity of occupation/sector choices are required. For identification of these behavioural parameters, other projects based on the SOUTHMOD microsimulation models have actually used time and space heterogeneity in tax-benefit systems in African labour markets (McKay et al., 2018), finding very small responses to taxation overall. Further, tying benefits and contributions would be ideal in a dynamic set-up. In a static setting, social contributions represent a liability, meaning that people pay for them but the benefit, e.g. pension would come in the future. However, we do take into account that other people are receiving benefits, such as pensions for past contributions. Further work should attempt to consolidate these issues and elicit the potential responsiveness in each specific country, a broad task that may require extensive research projects.

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Appendix

Table A.1. Summary of Tax-benefit Instruments in Tanzania and Ghana (2012-17)

TANZANIA	GHANA
Employee Social Insurance Contributions	
• All formal sector employees are liable to pay National health insurance • Contribution base is gross employment income • Contribution rate is 3% • Employees can voluntarily or involuntarily contribute to numerous fragmented pension schemes at rates of 5-15%.	• Employees are liable to pay SICs • Contribution base is gross employment income • Contribution rate is between 5% and 5.5%.
Personal Income Tax	
• Tax unit is the individual • Paid by employed and self-employed (with turnover > TZS20million • Definition of taxable income is labour income dependent on many different individual circumstances, see Leyaro et al. (2015) • Tax schedule is formed of five tax bands and rates between 0% and 35% • Presumptive tax (self-employment turnover < TZS20 million p.a) - individual level (0-5.25%) • Capital gains tax - (interest on land/buildings) 10% for residents). 20% for non-residents	• Tax unit is the individual (but for allowances an extended family is defined • Taxable income is labour income • Tax schedule is formed of five bands, rates are between 0% and 25% • Presumptive tax: turnover from non-farm income GHc10 000 - 120 000, at a flat tax rate 3%. • Capital income tax - (investment income/capital gains) - 15% in 2016-2017). In 2016, 8% tax introduced on rental
Value added Tax and Excise duties	
• VAT (18%) + zero rated goods • Excise duty (alcohol, tobacco, vehicles, fuel – rates range from 5-50% - see Leyaro et al. (2015) for specific rates	• VAT (13% in 2013; 13% in 2014 onwards but an additional 2.5% on goods subject to an excise tax (NHIL)) + zero rated goods • Excise duty (alcohol, petroleum, soft drinks bottled water and tobacco - tax rates range from 2.5 -171%, see Adu-Ababio, 2017 for specific rates)
Social Assistance benefits	
• Fixed basic cash transfer • Target low income households • Variable conditional cash transfer • Target, top-up cash transfer to low income households with children who cannot afford their education and health requirements • Eligibility for public works to earn extra income for four months of the lean season • Target individuals from low income households and must have been part of the basic cash transfer programme for at least 6 months	• Leap (Live empowerment against poverty) benefit transfer programme • Eligibility poor households that experience chronic food shortages and lack of capacity to engage in social risk mitigation • School capitation grant • Targets pupils in public primary schools • Each pupil under the scheme was covered by GHc 0.30 a day as at 2008.

Source: authors' compilation based on countries' SOUTHMOD reports
Notes: SIC – social insurance contributions; these countries also have other taxes such as taxes on gifts tax and fringe benefits, have only included those that are more relevant for this study.

Table A.2: Summary of Tax-benefit Instruments in South Africa and Ethiopia (2014-16)

SOUTH AFRICA	ETHIOPIA
Employee Social Insurance Contributions	
• All formal sector employees are liable to pay Unemployment Insurance Fund (UIF) • Contribution base is gross employment income • Contribution rate is 1% • Employees can also contribute towards different medical aid and pension schemes at variable rates depending on affordability.	• Employees are liable to pay SICs • Contribution base is gross employment income • Contribution rate is 7% for pension • Employer social contribution (11%)
Personal Income Tax	
• Tax unit is the individual • Paid by employees • Income tax payable is calculated as tax payable on (general taxable income plus income from interest payments less tax deductions on pension contributions) plus tax payable on lump sums less tax rebate and medical tax benefits • Tax schedule is formed of seven tax bands and rates from 18% to R53 2041 + 45% of taxable income above R1. 5 million). • Property income tax (0% -R85 000 +11% of property value). • Transfer duty (0% to R933 000 + 13% of value above R 10 million). • Dividends tax, 20%.	• Tax unit is the individual • Taxable income is labour income • Tax schedule is formed of seven bands, rates are between 10% and 35% • Business profit tax for self-employed - 10-35% • Turn over tax proclamation 2% on gross receipts of goods sold locally. • Tax on rentals of buildings - 0-35%. • Capital income tax - (investment income/capital gains) - 10% for business buildings; 30% for company shares. • Tax on interest income and tax on royalties, 5%. • Dividend gains tax - 10%.
Value added Tax and Excise duties	
• VAT (15%) + zero rated goods • Excise duty (alcohol, tobacco, vehicles, fuel – tax rates range from 0-45% • Customs duty 0-45%	• VAT (15%) + zero rated goods • Customs duty 0-20% on items for productive purposes; 30-35% for luxury items. • Excise tax, 10 bands ranging from 10-100%
Social Assistance benefits	
• Cash transfers • Means tested-old age pension (R1 410/1 430 per month), • Eligibility for 60+ year olds • Means test threshold is R64 680 per year for single people, R129 360 for couples • Disability grant (R1 430 per month) • Eligibility low income and disabled aged 18-59 years • War veterans grant (R1 430 per month) • Eligibility 60 years plus and fought in the second world or Korean war • Grant in aid (R330) • Child support grant (R330) • Foster childcare grant (R860) • Care dependency grant (R1 410) • Target care giver of permanently severely disabled child below 18 years and	• old age pension/ retirement pension and gratuity • Targets public servants • Rate 30% of average salary for last three years before retirement • Survivor's pension (15-50% of deceased public servant's pension given to spouse and children) • Private sector employee's pension • Conditional cash transfer under the public works programme • Targets individuals in poorest households with able bodies members who need more work • If four members of the household are enrolled each receives ETB 60 per day for 60 days in a year

Source: authors' compilation from Country's SOUTHMOD reports. Notes: SIC – social insurance contributions; these countries also have other taxes such as taxes on gifts tax and fringe benefits and games of chance, have only included those that are more relevant for this study.

Table A. 3. Summary of Tax-benefit instruments in Mozambique and Zambia (2015)

MOZAMBIQUE	ZAMBIA
Employee Social Insurance Contributions	
• All formal sector employees are liable to pay SICs • Contribution base is gross employment income • Contribution rate: private sector (self and not self-employed 7% i.e., 4% employer +3% employee; Public sector 7%	• Employees are liable to pay SICs • Employee pension contribution • Contribution base is gross employment income • Contribution rate is between 5% and 10%- subject to a ceiling of ZMW796 per month • Employer pension contribution is at 5%
Personal Income Tax	
• Tax unit is the individual • Personal income tax 1 (employment) • Tax Rate 0-32% • Personal income tax 2 (self-employment turnover< Mt 2.5million pa), tax rate 3% • Personal income 3 (Other - 10-32% fewer brackets) • Capital gains tax - (interest on land/buildings) 10% for residents). 20% for non-residents	• Tax unit is the individual • Taxable income includes labour income form employment self-employment, property and capital is labour income • Tax schedule is formed of four bands, rates are between 0% and 35% • Personal income tax (self-employment turnover < ZMW800 000pa) • Tax Rate = 3%
Value added Tax and Excise duties	
• VAT (17%) + zero rated goods • Excise duty (Beer - 40%; wine - 55%; spirits - 65%; tobacco -75%) • Fuel tax (7.21Mt/litre petrol & 4.27/litre diesel)	• VAT (16%) + zero rated goods • Excise duty (alcohol, tobacco petrol, diesel – various tax rates by type)
Social Assistance benefits	
• Basic social support programme • Unconditional regular cash transfers • Target low income households with a household member permanently unable to work due to illness or permanent disability • Age 55+ for females and 50+ for males • Applicant's income has to be equal to or lower than one third of national minimum wage • Amount ranges from Mt310 to Mt610 for one person household and five or more people in household • Direct social support programme • Consists of in-kind subsidies for a limited period of time to various situations of vulnerability e.g. child headed households and households with a member with chronic diseases • Average amounts range from Mt630 per month to Mt2383 per months for one person and more than three people in a household.	• Social cash transfer –urban • Target critically poor households and those with disabled members to reduce intergenerational transmission of poverty • Amount received: ZMW140 every two months • Social cash transfer rural • Home grown school feeding programme • Target is to provide free school meals to learners from public schools • Farmer input support programme • Public welfare assistance scheme

Source: authors' compilation based on countries' SOUTHMOD reports. Notes: SIC – social insurance contributions; these countries also have other taxes such as taxes on gifts tax and fringe benefits, have only included those that are more relevant for this study.

Table A.4: Treatment of income components in SOUTHMOD models – policy year 2015

Income component	SAMOD	MOZMOD	MicroZAMOD	GHAMOD	ETMOD	TAZMOD
Market income	Taken from the data	Taken from the data	Taken from the data	Taken from the data	Taken from the data	Taken from the data
Simulated taxes and social insurance contributions						
Employees SICs	Simulated	Simulated	Simulated	Simulated	Simulated	Simulated
Self-employed SICs	-	Simulated	-	-	-	-
Personal income tax	Simulated	Simulated	Simulated	Simulated	Simulated	Simulated
Turnover tax	-	Simulated	Simulated	Simulated	-	Simulated
Capital income tax	-	-	-	Simulated	-	-
Medical levy	-	-	Simulated	-	-	-
Simulated cash transfers						
Child benefits	Simulated	-	-	-	-	-
Disability benefits	Simulated	-	-	-	-	-
Social assistance benefits	-	Simulated	Simulated	Simulated	-	Simulated
Simulated in-kind transfers						
Direct Social Support Programme	-	Simulated	-	-	-	-
School capitation grant*	-	-	-	Simulated	-	-
Non-simulated tax-benefit instruments						
Contributory public pensions	-	Taken from the data	-	Taken from the data	Taken from the data	-
Social assistance benefits	-	-	-	-	Taken from the data	-

Source: Authors' elaboration based on SOUTHMOD documentation.

Notes: The school capitation grant in Ghana is simulated but not included in the concept of disposable income

Table A.5: Validation results based on our simulations with external statistics from SOUTHMOD country reports (in millions)

	Personal Income Tax		Employee Social Insurance Contributions		Social Cash Benefits	
	Simulated	External	Simulated	External	Simulated	External
Ethiopia	18,495	20,431	5,656	6,136	60[a]	66
Ghana	3,046	3,547	668	N/A	8.7[b]	N/A
Mozambique	8,508	21,311	3,142	3,445	3,284[c]	1,904
South Africa	326,670	392,000	371	N/A	129,982[d]	108,617
Tanzania	2,881,905	2,597,895	299,165[e]	N/A	194,000[f]	381,000
Zambia	1,986.00	N/A	1,019	1,269	358[g]	123

Source: author compilation from country SOUTHMOD Reports.
Notes: Reported amounts are in the countries' domestic currencies. a = Urban Productive Safety Net Programme (UPSNP), b = Social assistance (LEAP), c = Basic Social Subsidy Programme (BSSP) and Direct Social Subsidy Programme (DSSP), external statistics refer to 2016, d = sum of care dependence, foster care, child support and old age grants, e = NHIF employee contributions, f = PSSN, g = Social Cash Transfer. N/A: not available.

Table A.6: Comparison of Simulated Income Distribution Measures with External Sources

	Gini coefficient		Poverty (FGT0, %)*		External Source
	Disposable income	External Source	Disposable income	External Source	
South Africa	63.4	63.0	13.1	18.8	IBRD/WB 2018, using Living Conditions Survey
Mozambique	81.8	54.0	84.0	62.9	World Bank development indicators 2015
Zambia	74.7	69.0	70.5	57.5	Central Statistical office (CSO) 2016 / WB dev. indicators 2015
Ghana	71.0	42.3	31.0	24.2	2016 Ghana Poverty and Inequality Report, using GLSS data
Ethiopia	84.1	33.6	85.5	30.0	WB dev. indicators 2015
Tanzania	80.5	38.0	72.6	49.1	WB dev. indicators 2015

Notes: Per capita income measures of inequality and poverty. External sources based on consumption data rather than income data. Poverty line = $1.90 per day per person. Source: Disposable income simulated by the authors using SOUTHMOD microsimulation models and the associated datasets: the South African National Income Dynamics Study (2014); the Mozambican Inquérito ao Orcamento Familiar (2008-9); the Zambian Living Conditions Monitoring Survey (2010); the Ghana Living Standards Survey, version 6 (2012-13); Ethiopian Living Standards Measurement Study (2013-14) and the Tanzanian Household Budget Survey (2011-12). Source of external data as indicated.

Table A.7: Effect of tax-benefit components on poverty and inequality (ref.: Mozambique)

data country:	MZ	ZM	ZM	ZM	SA	SA	SA	GH	GH	GH	ET	ET	ET	TZ	TZ	TZ
uprated to:			MZ	MZ		MZ	MZ		MZ	MZ		MZ	MZ		MZ	MZ
policy country:	MZ	ZM	ZM	MZ	SA	SA	MZ	GH	GH	MZ	ET	ET	MZ	TZ	TZ	MZ
uprated to:			MZ			MZ			MZ			MZ			MZ	
	(1)	(2)	(2')	(C)	(2)	(2')	(C)	(2)	(2')	(C)	(2)	(2')	(C)	(2)	(2')	(C)
Δ *Gini Coefficient*																
disp. income - social benefits	-1.0	-1.0	-1.0	-0.2	-8.0	-8.0	-0.2	0.1	0.1	0.0	-0.3	-0.3	-0.3	-0.6	-0.6	-0.7
disp. income + income tax	0.6	-0.6	-0.6	0.1	-2.7	-2.7	-0.4	-0.3	-0.3	-0.3	-3.6	-3.6	-3.4	-2.1	-2.1	-0.3
disp. income + social contributions	-0.2	-0.3	-0.3	-0.2	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	-0.9	-0.1	-0.1	-0.1
Δ *Poverty headcount**																
disp. income - social benefits	-0.5	-0.1	-0.1	0.0	-22.2	-22.2	-0.3	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3	-0.1	-0.1	-0.6
disp. income + income tax	1.3	0.6	0.6	0.6	0.0	0.0	0.0	0.4	0.4	0.1	0.4	0.4	0.0	0.2	0.2	0.1
disp. income + social contributions	0.2	0.1	0.1	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1

Notes: South Africa=SA; Mozambique=MZ; Zambia=ZM; Ghana = GH; Ethiopia=ET; Tanzania=TZ. Policy year 2015. * Poverty line = $1.90 per day per person. Source: Author's calculation based on SOUTHMOD microsimulation models and associated data: the South African National Income Dynamics Study (2014); the Mozambican Inquérito ao Orcamento Familiar (2008-9); Zambian Living Conditions Monitoring Survey (2010); the Ghana Living Standards Survey, version 6 (2012-13); the Ethiopian Living Standards Measurement Study (2013-14) and the Tanzanian Household Budget Survey (2011-12) data.