SOUTHMOD

Country report

Zambia

MicroZAMOD v1.0

2010, 2015

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SOUTHMOD – simulating tax and benefit policies for development

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Acronyms

CSO	(Zambia) Central Statistical Office
FISP	Farmer Input Support Programme
HGSFP	Home Grown School Feeding Programme
LASF	Local Authority Superannuation Fund
LCMS	Living Conditions Monitoring Survey
NAPSA	National Pension Scheme Authority
PAYE	Pay as you earn
PSPF	Public Service Pension Fund
PWAS	Public Welfare Assistance Scheme
SCT	Social cash transfer
SEA	Standard enumeration area
VAT	Value-added tax
ZAPD	Zambia Agency for Person with Disabilities
ZMW	Zambian Kwacha

1   Basic Information

This report documents the development of a tax–benefit microsimulation model for Zambia, MicroZAMOD. The report provides a brief description of the tax–benefit system in Zambia in Section 1.1. The selected taxes and benefits that are simulated in MicroZAMOD are described in detail in Section 2. The report also describes the data that underpins the model, including any adjustments, imputations and assumptions made (Section 3). Section 4 concludes the report by providing a validation of the model findings based on external information.

1.1   Basic information about the tax–benefit system

Although Zambia's tax system is reasonably well developed and comparable with those found in most developing countries, the range of social benefits remains narrow and is in the process of development. As noted by the World Bank (2013), the social benefit programmes are too fragmented, incoherent, and transitory to provide a solid enough safety net. This has also been widely acknowledged by the Government of Zambia (MCDMCH 2014). Thus, Zambia is in the process of expanding its social protection programmes such as the social cash transfer (SCT) scheme and streamlining its other social protection policies.

The benefit system is largely contributory and consists of pension schemes governed by various laws.[1] The state pension age used to be 55 years. In November 2014, under the Public Service (Retirement Age) Regulations 2014 (Statutory Instrument No. 63 of 2014), this was raised to 65 years, but in May 2015 this was lowered to 60 years with options of 55 years and 65 years for early retirement and late retirement, respectively (Public Service (Retirement Age) (Amendment) Regulations, 2015 (Statutory Instrument No. 24 of 2015).

The tax system consists of direct and indirect taxes. The most important source of revenue is income tax, followed by value-added tax (VAT) (IMF 2015; ZRA 2015). Direct taxes are generally individual-based whereas some social protection programmes also have household-specific eligibility conditions.

The fiscal year in Zambia follows the calendar year and tax changes outlined in government budgets in the fourth quarter of the previous year usually take place at the beginning of the calendar year.

Primary school in Zambia starts at the age of 7 years, and free basic education includes seven grades of primary school followed by 5 years of secondary school. Dropout rates, however, are non-negligible at each grade throughout primary school (Ministry of Education, Science, Vocational Training and Early Education 2014).

There is no uniform definition of working age. For the purposes of the SCT scheme, working age or fit-for-work individuals are defined as being 19–64 years of age. In the Living Conditions Monitoring Survey (LCMS), socio-economic status is assigned to everyone 12 years of age or over. In the estimates derived from the Labour Force Survey (LFS), employment status is defined for individuals 15 years of age and above. The statutory minimum age for light work defined in the Employment of Young Persons and Children Act is 13 years, and the minimum contractual age is 16 years.

1.2   Social benefits

Benefit 1 (*SCTs*): The SCT programme was initiated as a pilot scheme by Zambia's Ministry of Community Development Mother and Child Health as an intervention to reduce extreme poverty and intergenerational transfer of poverty among beneficiary households and the community. The SCT pilots were designed to protect and promote the livelihoods and welfare of households suffering from critical levels of poverty and deprivation. Beneficiary households are entitled to ZMW 70 (~USD 7) per month, which they receive on a bi-monthly basis as a sum of ZMW 140 every 2 months (USD 14). Different eligibility criteria exist for urban and rural areas. Beneficiary households containing one or more disabled members are eligible for double the standard

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1   NAPSA Act, Public Services Pension Fund Act, Local Authorities Superannuation Fund Act, and Pension Scheme Regulation Act.

amount (ZMW 280 every 2 months). By December 2015, 50 districts (out of a total of 104 districts) were implementing the SCT programme in Zambia.

Benefit 2 (*Home-Grown School Feeding Programme*, HGSFP): This is a district-based programme administered by Zambia's Ministry of General Education covering 22 districts selected on the basis of a food security measure and education test scores of a particular district. All public schools in the eligible district provide free school meals daily to learners, prepared from maize meal, pulses, and oil. The HGSFP came into being in 2013 after the signing of a memorandum of understanding between the Ministry of Education and Early Education in Zambia and the United Nations World Food Programme. The main objective of this programme is to improve attendance and consequently the quality of education in schools, especially for learners from vulnerable and food insecure households (GRZ 2013). The HGSFP took over from an earlier supported feeding programme in which food commodities for the school feeding were procured from outside the country. The HGSFP is required to use only locally produced food; hence, the name of the programme.

Benefit 3 (*Farmer Input Support Programme*, FISP): This programme is administered by the Ministry of Agriculture and Livestock and is intended to benefit smallholder farmers in order to promote household and national food security by providing access to agricultural inputs. The FISP package consists of two 50-kg bags of basal dressing fertilizer, two 50-kg bags of top dressing fertilizer, and one 10-kg bag of maize seed. Efforts have been made to extend the package to non-maize crops. To benefit from this pack, farmers should be actively engaged in farming and have the capacity to cultivate between 0.5 and 5 ha. Eligible farmers should also belong to a farmers' cooperative and be able to pay a 50 per cent share of the subsidised package.

Benefit 4 (*Food Security Pack*): This consists of a package of inputs sufficient to cultivate 0.5 ha of maize, 0.25 ha of legumes, and in some cases chicken and goats. Eligibility of beneficiaries is based on having access to less than 1 ha of land, and having the ability to work but having no gainful employment. Furthermore, eligible households must either be headed by a female or have orphans or children, or a child head or disabled head. There is an obligation to make a partial repayment of the benefit in terms of the share of the yield from the pack.

Benefit 5 (*Public Welfare Assistance Scheme*, PWAS): This is the Government of Zambia's social assistance programme aimed at mitigating social economic shocks and other negative effects such as poverty and the HIV and AIDS pandemic. Specifically, PWAS is aimed at assisting the most vulnerable in society to fulfil their basic needs—particularly health, education, food, and shelter—in order to overcome problems of extreme poverty and vulnerability. Social support rendered under this scheme includes supply of food, shelter, clothing, and repatriation to stranded persons. There is also education support in that children from households registered under PWAS are provided with necessary school requirements for primary and secondary school. In addition, health care support assists in identifying destitute persons with orthopaedic medicines and appliances such as artificial limbs, shoes, crutches, and spectacles. PWAS targets extremely poor older persons, orphans or neglected children, chronically ill or disabled persons, and households headed by a single female.

Benefit 6 (*Orphans and Vulnerable Children Bursary*): The bursary is administered by Zambia's Ministry of General Education and is targeted at orphans and vulnerable children by providing them with secondary school fees and boarding fees.

1.3   Social contributions

The pension industry in Zambia is based on a compulsory and a voluntary system. Employees in the formal sector are required to contribute to one of three public schemes: the Public Service Pension Fund (PSPF), the National Pension Scheme managed by National Pension Scheme Authority (NAPSA), and the Local Authority Superannuation Fund (LASF). The LASF and PSPF are gradually being phased out with no new members. Therefore, these are not included in the description below.[2]

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2   Sources in this section include NAPSA (n.d).

Social contribution 1 (*National Pension Scheme*): All new private and public formal sector employees are required to register with a pension scheme administered by NAPSA. Presently, the monthly contribution rate is pegged at 10 per cent of a worker's gross monthly earnings (5 per cent is paid by the employee and 5 per cent by the employer). The contributions are subject to a ceiling. The contribution ceiling is revised annually and the revision takes effect from January of each year. The ceiling for 2015 was ZMW 796 per month. The following constitute gross earnings for NAPSA purposes: basic salary plus leave pay, commuted days, overtime, bonus, and all allowances such as housing and transport.

Social contribution 2 (*Workers' Compensation Fund*): In addition to the pension schemes, employers must register and pay contributions to the Workers' Compensation Fund Control Board. The contribution rates vary by economic activities and their associated risks. The Workers' Compensation Fund Control Board provides pensions to people who have been disabled or killed by a work-related accident or as a result of work-related diseases. Compensation is payable for temporary or permanent disablement and depends on the degree thereof. Temporary disablement is defined as not exceeding 18 months. When a worker's injuries are static, the degree of permanent disability will be determined. If the worker has suffered permanent disablement of 10 per cent, s/he will be eligible for a lump sum compensation. If the degree of disablement is 11 per cent and above, the worker is entitled to a pension for life.

1.4 Taxes

This section describes direct and indirect taxes. However, taxes that are not amenable to microsimulation such as company income tax and property transfer tax are not discussed.

Tax 1 (*Income tax*): This is a tax on profits earned by companies and emoluments earned by employees. Self-employed individuals are also liable to pay income tax. Thus, income tax consists of company income tax[3] and personal income tax. Personal income tax is levied on all income with a few exceptions such as Labour Day awards, ex-gratia payments, medical expenses, funeral expenses, and sitting allowances for councillors. Personal income tax in Zambia is largely collected via the 'pay as you earn' (PAYE) scheme.[4] It has four income bands that are adjusted on an ad hoc basis during national budgets to provide relief in times of high inflation.

Tax 2 (*Turnover tax*): This is a tax on gross sales/turnover such as income, earnings, revenue, yield, and proceeds of small individual traders or companies with an annual turnover of ZMW 800,000 or less unless they are voluntarily registered to pay VAT. This tax regime includes informal workers such as street traders.

Tax 3 (*VAT*): VAT on good and services is levied at the standard rate of 16 per cent and a 0 per cent rate for exports and selected non-export goods. There are also a number of VAT-exempted items/services.

Tax 4 (*Excise taxes*): Excise taxes are levied on selected commodities that include tobacco products, alcoholic beverages, petroleum products, motor vehicles, pollutants, cosmetics, and mobile telecommunication airtime. The taxes are levied at different rates and are either ad valorem or specific rates.

Tax 5 (*Medical levy*): This levy existed prior to 2013. It was charged at the rate of 1 per cent on gross interest earned on savings with banks and other financial institutions. In 2013, the medical levy was abolished together with all taxes on interest earned on savings in order to promote a culture of savings and investment.

2   Simulation of taxes and benefits in MicroZAMOD

2.1   Scope of simulation

Table 2.1 presents the treatment of benefits in MicroZAMOD. Complete simulation was possible for SCTs. The FISP and HGSFP are not simulated.

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3   See ZRA (2017) for a description of company income tax rates.

4   See ZRA (2016) for a description of PAYE.

FISP is not simulated as it is under review; and HGSFP has not been simulated as it is applied at the district level and the district boundaries changed between the time point of the dataset and the time point for the model (June 2015) and there is no look-up table.

Although SCT was also only implemented in 50 of the 104 districts in 2015, a decision was made to implement it across the whole of Zambia, because, unlike HGSFP, the intention is that it will be national in coverage.

Table 2.1: Simulation of benefits in MicroZAMOD

	Variable name(s)	Treatment in MicroZAMOD		Why not fully simulated?
		2010	2015	
Social assistance				
SCT	*bsa_zm*	—	S	2010 not simulated because SCT was still not widely scaled up
Agriculture benefits				
Farmer input Support pack	*bedot_zm*	I	I	Postponed until 2015 LCMS input dataset is used
Education benefits				
School feeding programme	*bot_zm*	I	I	2010 not simulated because implementation of HGSFP in its current form came into being in 2013. 2015 not simulated due to difficulty in mapping back new districts created after 2010 to those in the dataset

Notes: SCT, social cash transfer. LCMS, Living Conditions Monitoring Survey; HGSFP, Home Grown School Feeding Programme. '—' policy did not exist in that year; 'S' policy is *simulated* although some minor or very specific rules may not be simulated; 'I' policy is *included* in the microdata but not simulated.

Source: Authors' compilation.

In Table 2.2, the treatment of taxes and social contributions in MicroZAMOD are presented. Complete simulation for personal income tax, turnover tax, and VAT is possible. Excise duties with a significant impact on individuals are also simulated. Employee contributions to a pension scheme are also possible. Simulation of medical levy is only possible in the baseline year 2010 because it was abolished in 2013.

Table 2.2: Simulation of taxes and social contributions in MicroZAMOD

	Variable name(s)	Treatment in MicroZAMOD		Why not fully simulated?
		2010	2015	
Taxes				
Personal income tax	*tin_zm*	S	S	
Presumptive turnover tax	*ttn_zm*	S	S	
Medical levy	*thl_zm*	S	—	Abolished in 2013
VAT	*tva_zm*	S	S	
Excise duty	*tex_zm*	PS	PS	Simulated for alcohol, tobacco, and petrol/diesel
Social contributions				
Employee pension contribution	*tsceepi_zm*	S	S	
Employer pension contribution	*tscerpi_zm*	S	S	

Notes: VAT, value-added tax. 'S' policy is *simulated* although some minor or very specific rules may not be simulated; '—' policy did not exist in that year; 'PS' policy is *partially simulated* as some of its relevant rules are not simulated.

Source: Authors' compilation.

2.2   Order of simulation and interdependencies

Table 2.3 shows the order in which the main elements of MicroZAMOD are simulated, for 2010 and 2015 time points. There were no changes in the order of simulation between the two periods. Medical levy is only simulated in the baseline because it was abolished in 2013. Employee social contributions are simulated first. Next, turnover tax is simulated for self-employed individuals with annual turnovers below ZMW 800,000. Personal income tax is then simulated for those individuals above the turnover tax threshold and all those eligible to pay personal income tax. SCTs are simulated next, taking into account differences in rural/urban eligibility conditions by simulating separately for each area type. Finally, simulations are undertaken for VAT and excise duties.

Table 2.3: MicroZAMOD spine: Order of simulation

Policy	2010	2015	Description of the instrument and main output
uprate_zm	On	On	DEF: Uprating factors
expenditure_zm	On	On	DEF: Expenditure variables for VAT
assets_zm	On	On	DEF: Asset variables for SCT
ildef_zm	On	On	DEF: Income concepts
tudef_zm	On	On	DEF: Assessment units
constdef_zm	On	On	DEF: Constants
tsceepi_zm	On	On	SIC: Employee pension contributions
tscerpi_zm	On	On	SIC: Employer pension contributions
ttn_zm	On	On	TAX: Turnover tax
tin_zm	n/a	On	TAX: Personal income tax
thl_zm	On	Off	SIC: Medical levy
bsa_rural_zm	n/a	On	BEN: Social cash transfer – rural areas
bsa_urban_zm	n/a	On	BEN: Social cash transfer – urban areas
bedot_zm	n/a	Off	BEN: Farmer input support pack
bot_zm	n/a	Off	BEN: School feeding programme
tva_zm	On	On	TAX: VAT
tex_zm	On	On	TAX: Excise duty
output_std_zm	On	On	DEF: Standard output individual level
output_std_hh_zm	On	On	DEF: Standard output household level

Notes: DEF, definitional policy; SIC, social insurance contribution policy; BEN, benefit policy.

Source: Authors' compilation.

2.3   Social benefits and contributions

2.3.1 SCT (bsa_s)

SCTs are provided to needy households in rural and urban areas.

Definitions

Fit for work: all those members of the household capable of working (i.e. not chronically ill or disabled), aged between 19 and 64 years, and not attending school.

Eligibility conditions

In order to be eligible for SCT in rural areas, the household should satisfy the following conditions (GRZ 2015):

- Residency test: only households who have been residing in the same catchment area for at least 6 months are eligible.
- Demographic test: only households without fit members or with a ratio of unfit to fit members equal to three or more are eligible (fit are all those members capable of

working, who are not chronically ill or disabled, and who are aged between 19 and 64 years and not attending school).

- Living conditions test: households with a living conditions index score (see below) indicating they are relatively better-off are excluded.

These criteria are similar to those used in urban areas, although eligible urban households have to fulfil an additional requirement that the household must contain at least one disabled member of any age. Furthermore, the living conditions test, consisting of the living conditions index, was designed using different characteristics or variables for urban and rural areas. Each of these characteristics is associated with a specific contribution score that is summed up to give a total household score. The living conditions test is, in effect, a 'proxy means test'—the higher the total score the greater the chances that the household is relatively well off; the lower the total score the greater the chances that the household is relatively poor.

The ten variables used for rural areas in the living conditions index are: highest education level achieved by household members 15 years and above, type of toilet used, type of roof in the house, source of lighting, most used cooking fuel, ownership of mattress, ownership of sofa, ownership of television, ownership of clock, and ownership of electric iron.

The ten variables for urban areas are the following: Highest education level achieved by household members 15 years and above, type of dwelling, type of toilet used, type of floor in the house, source of lighting, ownership of bed, ownership of sofa, ownership of computer, ownership of dining table, and ownership of electric iron.

Income test

There is no income test for this benefit (although the living conditions index is, in effect, a proxy means test).

Benefit amount

In 2015, the benefit amount was ZMW 70 per month and paid bi-monthly (so ZMW 140 was paid once every 2 months). Households containing one or more disabled persons received double the amount (i.e. ZMW 280 was paid every 2 months).

MicroZAMOD notes

The residence test requires that households should have resided in the same catchment area for at least 6 months to be eligible for the cash transfer. However, the dataset only contains a question about where the person resided 12 months previously and so this criterion was applied instead.

2.3.2 Employee social contributions

All employees in wage employment are liable to pay a pension contribution calculated at 5 per cent of gross salary plus leave pay, overtime, bonus, and all allowances. The other 5 per cent is paid by the employer. Minimum contribution as at 2015 was ZMW 255 per month. The contributions are also subject to a ceiling, and in 2015 the contribution ceiling was ZMW 796 per month.

2.3.3 Employer social contributions

All employers are liable to contribute 5 per cent of the employee's gross earnings towards their pension.

2.4 Personal income tax

2.4.1 Tax unit

Personal income tax is levied on an individual basis. There is no joint taxation.

2.4.2 Exemptions

Following Verbist (2004), we define exemptions as 'income components (that) are part of pre-tax income, but do not have to be declared to the tax authorities, and thus are not included in the concept of taxable income (e.g. child benefits in most countries)'. In Zambia, these include Labour Day awards, ex-gratia payments, medical expenses, funeral expenses, sitting allowances for councillors, and benefits that cannot be converted into cash.

2.4.3 Tax allowances

Here, we define tax allowances as any amount subtracted from pre-tax income (including social insurance contributions). Differently from Verbist (2004), there is no distinction between those that are fixed amounts (tax allowances) and those whose level is a function of pre-tax income (deductions). In addition to contribution to pension calculated at 5 per cent (or ZMW 255, whichever is lower) of the wage income, there is a tax allowance for disabled persons of ZMW 600 per month. To be eligible for the disability allowance, one has to be certified by the Zambia Agency for Persons with Disabilities (ZAPD).

2.4.4 Tax base

The tax base is defined as taxable income minus contributions to pension and tax allowances.

Taxable income includes income from employment, self-employment, property, and capital. The following is the personal income tax schedule for 2015:

- ZMW 0–36,000 per year at 0 per cent
- ZMW 36,001–45,600 per year at 25 per cent
- ZMW 45,601–70,800 per year at 30 per cent
- Above ZMW 70,800 per year at 35 per cent.

MicroZAMOD notes

The ZMW 600 per month allowance for disabled people for personal income tax purposes is not implemented in the model because of the requirement that the eligible person be certified by ZAPD and this information is not captured in the data. Awarding the allowance to all disabled people would greatly inflate the numbers eligible for the allowance.

Furthermore, the LCMS dataset does not contain information on expenses from the incomes of self-employed individuals. The 2014 LFS does, however, ask about the cost of business expenses incurred in running the respondent's main business activity. Using this information, it was determined that expenses for the self-employed (with turnovers greater than ZMW 800,000—the turnover tax threshold, see below) equate to 35.0 per cent of the total turnover. Therefore, net income (i.e. profit) for tax purposes for those self-employed who do not fall within the scope of turnover tax was imputed as 65.0 per cent of their total turnover.

2.5 Indirect taxes

Indirect taxation in Zambia includes VAT as well as excise duty on certain goods. The standard rate of VAT is 16 per cent and there are a number of exempted and zero-rated goods and services. VAT-exempted goods and services include, for example, water supply, health and education, books and newspapers, as well as a number of agricultural and food products. Zero-rated goods include exports and, for example, building supplies, medical supplies, agricultural equipment, and energy-saving appliances equipment and machinery (ZRA 2014).

Excise duty is applicable to various goods. The excise duty rates are presented in Table 2.4.

Table 2.4: Excise duty rates (2015)

Commodity	Rate
Clear beer	60%
Opaque beer	ZMW 0.15/litre
All types of wines	60%
Undenatured ethyl alcohol of an alcoholic strength by volume of less than 80%, spirits, liqueurs, and other spirits beverages	60%
Cigars, cheroots, cigarillos, and cigarettes of tobacco substitutes	ZMW 90/1,000 pieces
Other manufactured tobacco substitutes 'homogenized' or reconstituted tobacco extracts and essences	ZMW 90/1,000 pieces
Petroleum spirit	ZMW 1.142/litre
White spirit	15%
Other light oils	15%
Kerosene (domestic)	0%
Kerosene (industrial)	0%
Low sulphur gas oil	30%
Automotive gas-oils (diesel)	ZMW 0.87/litre
Other fuel oils	30%
Petroleum gases and other gaseous hydro-carbons	ZMW 0.45/litre
Electrical energy	3%
Air time	15%
Beauty make-up kits, body and hair creams, and perfumes	20%
Undenatured ethyl alcohol of an alcoholic strength by volume of 80% or higher, when imported by a non-licensed importer	20%

Source: ZRA (n.d.).

MicroZAMOD notes

Excise duty has been simulated for alcohol, tobacco, and petrol/diesel.

2.6   Other taxes—Turnover tax

This tax is applied at the rate of 3 per cent on the annual turnover of self-employed people whose turnover falls below the threshold of ZMW 800,000. This tax is levied on receipts with no deductions for expenses. It is designed for those small traders who do not keep detailed accounts.

3   Data

3.1   General description

The MicroZAMOD underpinning dataset is drawn from the 2010 LCMS (CSO 2012) (Table 3.1). The LCMS is a cross-sectional survey that was administered to a representative sample of households drawn using the 2000 Census of Population and Housing as the sampling frame. Standard enumeration areas (SEAs) were the primary sampling units. A two-stage stratified cluster sample design was used: as part of the first stage, 1,000 SEAs were selected using probability proportional to estimated size; as part of the second stage, 15 households were selected for rural SEAs and 25 for urban SEAs.

Table 3.1: MicroZAMOD database description

Original name	Living Conditions Monitoring Survey
Provider	Central Statistical Office
Year of collection	2010
Period of collection	March/April 2010
Income reference period	2010
Sample size	19,398 households
Response rate	98%

Source: Authors' compilation.

The response rate, as measured by the proportion of successful interviews from the originally selected households, was 98 per cent. Non-responding households were systematically replaced. In total 19,398 households, with 102,883 individuals, were successfully interviewed. The survey is representative at national, provincial and district levels (there were 72 districts in 9 provinces in Zambia in 2010), as well as for urban and rural areas. Although adjustments were made to take into account small district sizes, CSO (2012) does urge caution when undertaking analysis at district level.

Households are defined as a group of persons who normally eat and live together. They may or may not be related by blood, but make common provision for food and other essentials. The household head is identified by the household as the person who normally makes day-to-day decisions concerning the running of the household. Households with a child head are also captured in the data: examination of the data reveals that just 12 of the 19,398 household heads (<0.1 per cent) are aged below 18 years.

The 2010 LCMS data are not publicly available but can be obtained from the Zambia Central Statistical Office (CSO) subject to providing a letter outlining the purpose of study and gaining approval from the director. The survey was undertaken in English and there is a 'Survey Report' in English. The data were not supplied with metadata; however, data dictionaries are available from the CSO and International Household Survey Network websites (see CSO 2017; IHSN 2017). CSO staff can also be contacted for further information on the data. In general, the variables are labelled and the variable names refer to the section/question number.

The data files contain weights. The sampling weights were defined as the inverse of the product of the two selection probabilities employed at each stage of selection. The weights were adjusted using population projections at district level for 2010.

Missing values in the dataset supplied had not been imputed.

3.2   Data adjustment

3.2.1   Household unique identifier

The original identifier for households, *hhid*, was found not to be unique, resulting in duplicate cases of households. It was ascertained that the original identifier lacked one key location variable to uniquely identify each household. Therefore, a new unique identifier *hhid_new* was created with the location variable *Stratum* included. The fs package was used to allow for the creation of the new *hhid* variable in all the data files at once. This resulted in the creation of a 17-digit ID.

3.2.2   Demographic variables

The variable 'age' in the LCMS was recorded either as years or months, as specified using the age code. Therefore, where appropriate, ages recorded in months were converted to years. However, the data preparation work revealed a number of instances of probable miscoding of the age code variable, where respondents' age values had been coded as 'months' yet other variables suggested that the correct age code should have been 'years', and vice versa. These probable errors were manually adjusted to produce more plausible age values.

The 'relationship' variable in the LCMS denotes the respondent's stated relationship to the nominated head of household. The relationship information is needed primarily to inform decisions concerning the *idpartner*, *idfather*, *idmother*, and *idparent* variables. The data preparation work revealed a number of issues with the 'relationship' variable in the raw data. For example, some households reported multiple heads of household, whereas other households reported no head of household. In some households, two or more respondents reported being the spouse of the head of household, which may be an indication of polygamous relationships or may be a coding error in the data. Some households reported that a child was the head of household, which in some cases may have been true but in other cases seemed implausible given the demographics of the other members of the household. An extensive series of checks and adjustments were applied to the 'relationship' variable drawing upon information contained within other variables in the dataset; this resulted in the creation of a new demographic variable called *relationship_new*. Every household contains one (and only one) head of household using the *relationship_new* variable, and households with plausible polygamous marriage structures have been coded so that the most likely spouse is identified as 'spouse' and other spouses are classified as 'second, third etc. wives'. Deriving the *relationship_new* variable was a particularly time-consuming exercise given the various internal inconsistencies between variables in the LCMS dataset, which added a further level of complexity to the process of choosing the best adjustment to make based on other individual and household factors.

The *idpartner*, *idfather*, *idmother*, and *idparent* variables were derived using the *relationship_new* variable. These variables could only be derived for respondents who had one of these direct associations with the head of household. No other intra-household relationship information is contained within the LCMS. In light of the lack of more detailed relationship information, any 'loose children' present within a household were assigned to the head of household (and their spouse, if present).

There were also many missing values for the marital status variable, mainly because marital status is reported for all those aged 12 years and above, whereas the minimum age for marriage in Zambia is 18 years (and parental consent is required if a girl or boy is aged 16–17 years). Anyone below 16 years is a minor and marrying someone below 16 years is an offence, as sex with a minor is defilement that is serious crime punishable by imprisonment of up to 25 years. Therefore, marriage between people below 16 years was considered void and all missing marital statuses for children aged 0–15 years were recoded as 'never married'.

To deal with missing marital status for those aged 16–20 years inclusive, a case-by-case assessment was undertaken using information on the respondents' economic status and relationship to household head. This assessment suggested that all these missing cases were most likely 'never married'. An adjustment was also made for those aged 21 years and above who were full-time students and had missing data on their marital status, with these cases similarly being edited to 'never married'.

An examination of the relationship to the head of household variable for the remaining cases with missing marital status revealed these to be mostly grandchildren of the head, or brothers/sisters of the head, or adult sons/daughters of the head. These cases were also recoded to be 'never married'. The heads of households with missing marital status had to be checked manually for presence of spouse, children, age of household head, etc., and adjusted accordingly.

3.2.3 Labour market variables

Occupation: Following the one-digit classification as per EUROMOD convention, the variable loc was created on the basis of the first digit of the four-digit ISCO code in the 2010 LCMS. These are defined as follows:

>   1 = Legislators, senior officials and managers
>   2 = Professionals
>   3 = Technical and associate professionals
>   4 = Clerical support workers
>   5 = Service and sales workers
>   6 = Skilled agricultural, forestry and fishery workers
>   7 = Craft and related trade workers
>   8 = Plant and machine operators and assemblers

9 = Elementary occupations
0 = Armed forces occupation

3.2.4 Households/individuals dropped from original

One household was identified with no information other than household identification characteristics and was dropped. As the household did not have a weight either, there was no need to make adjustments to the weights after it was dropped.

3.2.5 Income amounts

Each income variable was assessed in terms of its distribution and the effects of any outliers. Each income variable (except *yiy*: 'monthly income from interest or dividends or shares') was capped at the value of the 99th percentile in order to limit the impact of extremely high income values. There were very few cases of *yiy* reported in the dataset (fewer than 100 cases) and so this income variable was capped at the third highest value.

3.2.6 All monetary amounts

The Zambian government enacted the Re-Domination of Currency Act (Act 8 of 2012) on 3 December 2012. The re-denomination would consist of dividing the old currency unit by 1,000. On 1 January 2013, the Bank of Zambia implemented the re-denominated Kwacha. This re-denomination had implications for MicroZAMOD as the LCMS 2010 data recorded monetary values under the old currency, while the monetary values needed for the policy rules and as the basis of the external validation statistics were obtained on the new currency units. To address this inconsistency, all monetary values in the LCMS 2010 dataset were divided by 1,000.

3.3 Imputations and assumptions

3.3.1 Time period

The reference period for all the variables in the input data set is 2010.

3.3.2 Gross incomes

Income data in the original sample was reported as gross.

3.4 Updating

To account for any time inconsistencies between the input dataset and the policy year, uprating factors are used. Each monetary variable (i.e. each income component) is updated so as to account for changes in the non-simulated variables that have taken place between the year of the data and the year of the simulated tax–benefit system. Uprating factors are generally based on changes in the average value of an income component between the year of the data and the policy year.

The list of uprating factors as well as the sources used to derive them are shown in Table 3.2.

Table 3.2: Raw indices for deriving MicroZAMOD uprating factors

Constant name	Values of the raw indices							Income components uprated by the index
	2009	2010	2011	2012	2013	2014	2015	
$f_CPI_overall	100.02	107.93	114.52	122.16	131.13	141.48	151.46	All expenditure and income
$f_CPI_food	100.24	106.26	110.31	118.11	126.45	136.32	146.04	Food expenditure
$f_CPI_non_food	99.81	109.85	119.85	119.37	126.82	136.51	147.42	Non-food expenditure
$f_CPI_alc_tob	100.00	103.04	108.49	112.38	119.80	136.29	155.05	Alcohol and tobacco
$f_CPI_transport	100.00	113.77	117.06	125.64	136.12	151.72	169.12	Petrol and diesel
$f_Earnings_inflatora	n/a	100.00	n/a	n/a	n/a	n/a	229.24	Earnings

Notes: CPI, consumer price index. aDerived through interpolation between and extrapolation of LFS 2008, 2012 and 2014 data.

Source: Authors' compilation and Central Statistical Office (for CPI data).

4 Validation

4.1 Aggregate validation

MicroZAMOD results have been validated against external benchmarks wherever possible. The main discrepancies between MicroZAMOD results and external benchmarks are discussed in the following subsections. Factors that may explain the observed differences are also discussed.

4.1.1 Validation of incomes inputted into the simulation

The actual macro-validation tables are included in the Annex. Comments are made here on the main results with reference to the tables in the Annex.

Number of people employed and unemployed in the input dataset

Table 4.1 in the Annex presents the number of paid employees, self-employed, and unemployed persons as calculated using the 'main economic activity' question in the 2010 LCMS, and compares these with figures derived separately by Zambia Institute for Policy Analysis & Research (ZIPAR) through a process of interpolation between the 2008 and 2012 LFS. It is evident from Table 4.1 that the number of paid employees according to the MicroZAMOD input dataset is approximately 81 per cent of the figure according to the interpolated LFS approach. With regard to self-employed persons, the figure according to the MicroZAMOD input dataset is approximately 115 per cent of the figure according to the interpolated LFS approach. For unemployed persons, the figure according to the MicroZAMOD input dataset is approximately 88 per cent of the interpolated LFS approach. The differences may be due to a number of possible factors, such as different category definitions, different measurement approaches, different survey weightings, and, of course, the interpolation approach applied to the LFS is a form of estimation only, which may not produce true figures for the 2010 time point comparison year.

Number of people receiving different kinds of market income in the input dataset

Table 4.2 in the Annex presents the number of individuals reporting receipt of each of the listed income sources in the 2010 LCMS and compares these with external statistics. As was the case in Table 4.1, the external validation statistics for the number of people in paid employment and in self-employment (covering agricultural and non-agricultural employment) are again derived through a process of interpolation between the 2008 and 2012 LFS (with the interpolation undertaken by ZIPAR). It was not possible to obtain external validation statistics on the number of recipients of other income sources, such as income from investments. As such, the only comparisons that can be performed are for paid employees and self-employed persons.

It is evident from Table 4.2 that the number of people receiving income as a paid employee in the LCMS dataset is approximately 86 per cent of the number of paid employees estimated using the LFS approach. In terms of persons receiving income from self-employment, the number of persons recorded in the 2010 LCMS input dataset (receiving either non-agricultural self-employment income or agricultural income) equates to approximately 88 per cent of those estimated to be in self-employment using the interpolated LFS approach. With regard to the comparison for self-employed persons, receipt of agricultural income (i.e. turnover and associated expenses) is reported at household level in the 2010 LCMS, and so only one member of the household is assigned agricultural income when, in reality, multiple members may in fact generate that income. Separate analysis of the 2010 LCMS (not presented in detail here) shows that only 45 per cent of persons who stated their main economic activity to be 'farmer' were assigned an agricultural income, as a result of this issue.

As expected, there are discrepancies between Tables 4.1 and 4.2 in terms of the figures for 'paid employees' and 'self-employed' in their respective entries. With regard to 'paid employees', it is evident that the 2010 LCMS records more people receiving a waged income (i.e. yem) than the number of people reporting that their main economic activity is 'in paid employment'. On the one hand, this might be regarded as somewhat surprising given the acknowledged issue of missing income values for people in employment (approximately 10 per cent of persons who report their main economic activity is 'employee' fail to report any waged income). However, on the other hand, persons whose main economic activity is not 'in paid employment' can also legitimately receive a waged income (e.g. students). Separate analysis of the 2010 LCMS (not

presented in detail here) shows that the three largest categories of 'main economic activity' (other than 'employee') reporting waged income were 'other', 'employer or self-employed', and 'student'. Indeed, the combined number of persons in these three categories reporting waged income exceeds the number of cases with missing income data among those who report themselves as 'employee'.

Aggregate amounts of different kinds of market income reported in the input dataset

Table 4.3 presents the aggregate annual amounts of various types of market income in the input dataset and external statistics. As in Table 4.2, external statistics are available only for amounts of income generated through paid employment and self-employment (again, using the LFS interpolation approach). It is evident that the amount of income recorded through paid employment in the 2010 LCMS equates to approximately 84 per cent of the figure estimated using the LFS. In contrast, the amount of income recorded through self-employment in the 2010 LCMS equates to just 26 per cent of the figure estimated using the LFS. This disparity accords with existing concerns within ZIPAR about the possible under-reporting of income for the self-employed in the LCMS. In earlier work using the 2010 LCMS data, researchers at ZIPAR used the 'propensity to consume' concept (Nalishebo and Halwampa 2014). Assuming that the paid employees are more likely to report their incomes correctly, Nalishebo and Halwampa (2014) compared the relationship between food expenditure and income between paid employees and the self-employed. They made an assumption that the underlying relationship between incomes and food expenditures is similar between those in paid employment and those in self-employment. They then estimated the relationship between incomes and expenditures for paid employees and derived a ratio. Based on food expenditure reported by the self-employed, the derived ratio from paid employees was applied to the self-employed to predict the 'true' income for the self-employed (Nalishebo and Halwampa 2014). It is recommended that further work be undertaken to assess the impact of and devise a solution to the problem of missing income values in the 2015 LCMS during the 2017 calendar year.

Number of people receiving different types of non-simulated benefits and number of payers of non-simulated taxes in the input dataset

It was not possible to obtain any suitable external statistics to enable these figures to be validated. As such, Table 4.4 in the Annex is left blank.

Aggregate amounts of different types of non-simulated benefits and non-simulated taxes in the input dataset

It was not possible to obtain any suitable external statistics to enable these figures to be validated. As such, Table 4.5 in the Annex is left blank.

4.1.2 Validation of outputted (simulated) instruments

Table 4.6 in the Annex presents the differences between the number of recipients of various types of simulated benefits/number of payers of simulated taxes in MicroZAMOD and external statistics. Table 4.7 in the Annex presents the aggregate yearly amounts of various types of simulated benefits/simulated taxes in MicroZAMOD and external statistics.

In relation to VAT, MicroZAMOD simulates just 18 per cent of the total VAT received by government in 2015. It would never be expected that a household survey would enable the full VAT take to be simulated because VAT is paid from a number of sources that would not be measured in a household survey. However, the figure does seem low and possible reasons for this include:

- Incomplete capturing of VAT-applicable expenditures by households.
- The Ministry of Finance (MoF) reports a higher than expected VAT revenue for 2015 and makes the following observation: 'In terms of Value Added Tax, revenue receipts stood at ZMW 8.37 million, which was above the target of ZMW 6.58 billion by 27.2 percent. This outturn was on account of higher prices of supplies in the domestic market recorded in the year under review, as well as improved compliance' (MoF 2016: 29).

In relation to personal income tax, Table 4.7 shows that 68 per cent of non-company income tax is simulated by MicroZAMOD. However, there are a number of caveats that should be kept in mind:

- **Published data**: Data published on income tax are not sufficiently broken down into the required categories. The MoF publishes income tax totals for company tax (not relevant here), PAYE, and 'Other income tax—withholding tax' (which includes turnover tax and other income taxes). This means that turnover tax is combined with all other categories of withholding tax in the published data and so it is not possible to compare the simulated outputs with directly comparable categories of published figures for income tax. This is particularly relevant in 2015 as the MoF notes that there was a particularly high amount of property transfer tax received that year, which is included within the withholding tax reported figure but was not simulated in MicroZAMOD: 'Withholding tax was also higher by 32.9 percent mainly boosted by higher than anticipated property transfer tax collections' (MoF 2016: 29).
- **Missing income data**: The income data contain many missing values. Values could be imputed and it is recommended that the imputation work should be undertaken in 2017 using the new 2015 LCMS rather than investing extra time in the increasingly out-of-date 2010 LCMS at this stage.

In relation to the SCT, MicroZAMOD simulations yield 372,453 eligible households. This is approximately twice as many households as actually recorded as being in payment in December 2015. This discrepancy is to be expected, given that MicroZAMOD simulates the SCT policy on the basis of a full national roll-out, whereas in reality SCT was only partially rolled out to selected geographical districts as of December 2015. Unfortunately, it was not possible to constrain the SCT simulations to selected geographical districts because of the realignment of district boundaries and geographical identification codes that occurred between the time of the 2010 LCMS enumeration and the SCT roll-out. The simulated SCT amounts presented in Table 4.7 are almost three times larger than the actual amounts for 2015 provided by MoF. This is again likely to be due in large part to the assumption of a full national roll-out in MicroZAMOD. However, this may also be due in part to the assumption in MicroZAMOD that all households with a disabled person received double SCT (as per the official eligibility guidance) when, in reality, this may not have been fully achieved (and/or the disability categorization applied in reality may be more stringent that that applied in MicroZAMOD).

In relation to pensions, MicroZAMOD simulates 124 per cent of the reported number of contributing employees to NAPSA's scheme. One possible explanation for an over-estimation of NAPSA contributors is that, in 2015, there were still some active contributors to the LASF and PSPF schemes.

4.2 Income distribution

In the 2015 LCMS report (CSO 2016), poverty levels are assessed using two poverty lines: a lower-bound poverty line (or 'extreme' poverty as defined by CSO) and an upper-bound poverty line (or 'total' poverty as defined by CSO, which also includes those in 'moderate' poverty as well as those in 'extreme' poverty). CSO bases its poverty measurements on consumption expenditure rather than income, stating that 'household consumption expenditure serves as a useful proxy for household income, which in many cases tends to be under-reported by most households' (CSO 2016: 86). CSO states that 'Household expenditure for the 2015 LCMS was obtained by adding the various goods and services purchased, consumed from own production and received as gifts. Consumption expenditure of all these goods and services was converted into Zambian Kwacha values, converted into monthly values, and then added together to obtain a measure of monthly household expenditure' (CSO 2016: 88). CSO adopts an 'adult equivalent' approach to equivalizing household consumption expenditures for the purpose of poverty measurement. The lower-bound poverty line in 2015 was ZMW 152 per adult equivalent per month, whereas the upper-bound poverty line in 2015 was ZMW 214 per adult equivalent per month.

With regard to inequality measurement, the 2015 LCMS report (CSO 2016) presents Gini coefficients based on both consumption expenditure and income. Whereas for poverty rate calculations CSO uses the adult equivalent approach to equivalization, for inequality calculations CSO adopts a per-capita equivalization approach.

The poverty and inequality measures constructed using the simulated outputs from MicroZAMOD are all based on disposable income rather than consumption expenditure. This means that, although it is possible to compare the inequality measures on a relatively like-for-like basis (by utilizing CSO's income-based Gini coefficient), there is a notable discrepancy in the approach to poverty measurement between CSO and the MicroZAMOD output presented here (as CSO does not present any income-based poverty measures). In terms of equivalization scales, MicroZAMOD poverty measures are constructed using CSO's adult equivalent scales whereas MicroZAMOD Gini coefficients are constructed using the per-capita approach adopted by CSO.

Consumption-based inequality measures typically produce lower values than income-based inequality measures (for a given country and a given time period) because consumption is not linearly related to income. This is for two main reasons: (i) individuals/households with the highest incomes often save a sizeable proportion of their income rather than spend it on consumption items; and (ii) individuals/households with the lowest incomes (and indeed zero incomes) may still be able to report a degree of consumption, for instance due to subsistence farming and/or borrowing from family/neighbours.

4.2.1 Income inequality

Table 4.8 in the Annex compares the Gini coefficient calculated from the June 2015 MicroZAMOD-simulated outputs with the relevant Gini coefficient presented in CSO's report on the LCMS 2015 data (CSO 2016). Both Gini coefficients are based on per-capita income. It is evident from Table 4.8 that the Gini coefficient calculated from MicroZAMOD (Gini = 0.75) is somewhat higher than the Gini coefficient presented in the CSO (2016) report (Gini = 0.69). This discrepancy is partly attributable to differences in the way that households with zero income are treated: in MicroZAMOD, zero-income households are retained and included in the Gini calculation, whereas in the CSO (2016) report, zero-income households are excluded from the Gini calculation. Excluding zero-income households from the MicroZAMOD calculation results in a drop in the Gini coefficient from 0.75 to 0.73. The remaining discrepancy may be partly or largely attributable to the different input datasets used: MicroZAMOD currently uses the LCMS 2010 dataset as the basis for simulating 2015 outcomes, whereas the CSO (2016) report uses the 2015 LCMS dataset as the basis for its analysis.

4.2.2 Poverty rates

Table 4.9 in the Annex presents lower- and upper-bound poverty rates for 2015 derived from the simulated MicroZAMOD output data and compared against the poverty rates presented in the CSO (2016) report. As noted earlier, there is an important difference in the way that poverty is measured between MicroZAMOD and the CSO (2016) report, with MicroZAMOD adopting an income-based approach and CSO adopting a consumption expenditure-based approach. As expected, given the differing bases of poverty measurement, the poverty rates derived from the MicroZAMOD output are higher than those presented in the CSO (2016) report. In terms of the lower-bound poverty line (i.e. 'extreme' poverty as defined by CSO), the poverty rate for June 2015 derived from MicroZAMOD stands at 59.2 per cent compared with 40.8 per cent presented in the CSO (2016) report. As such, the income-based figure from MicroZAMOD is 1.45 times larger than the consumption expenditure-based figure from the CSO (2016) report. In terms of the upper-bound poverty line (i.e. 'total' poverty as defined by CSO), the poverty rate for June 2015 derived from MicroZAMOD stands at 66.3 per cent compared with 54.4 per cent presented in the CSO (2016) report. As such, the income-based figure from MicroZAMOD is 1.22 times larger than the consumption expenditure-based figure from the CSO (2016) report.

In addition to the important differences in income-/consumption expenditure-based measures discussed, it is also important to keep in mind that the MicroZAMOD measures are calculated from simulations carried out on the LCMS 2010 dataset, whereas the CSO (2016) report presents calculations carried out on the new 2015 LCMS dataset. This is also likely to be a factor in the discrepancies observed between the two sets of poverty figures.

4.3   Summary of 'health warnings'

The LCMS data required extensive cleaning in order to produce the compulsory variables required by the EUROMOD software for MicroZAMOD. Nevertheless, there may be further steps that could be taken in this regard, particularly in relation to the income data. However, as the 2015 LCMS is now available data cleaning processes will be prioritized for this more recent dataset.

Every effort has been made to collate the precise tax and benefit rules for 2015 but this was difficult to achieve and has been an iterative process. The work plan for 2017 will include continued validation of the interpretation of the policy rules in MicroZAMOD, with key stakeholders as well as any consequent refinement of the implementation of those rules within MicroZAMOD.

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Annex

Table A1: Number of employed and unemployed in Zambia, June 2010

Employment status	Input dataset (2010 LCMS) (A)	External statistics 2010 (B)	Per cent captured (A/B)
Paid employees	816,641	1,010,000	81
Self-employed (including farming)	2,567,955	2,230,000	115
Unemployed	379,089	430,000	88

Note: The figures reported in column A are for non-overlapping categories; that is, a person cannot report being both a 'paid employee' and 'self-employed' as the LCMS question asks for 'main economic activity'.

Source: Column A: 2010 LCMS prepared as the input dataset for MicroZAMOD (figures derived from 'main current economic activity' question). Column B: Figures derived by interpolating between LFS 2008 and LFS 2012 (with interpolations calculated by ZIPAR).

Table A2: Number of recipients of various types of market income, June 2010

Income type	Input dataset (2010 LCMS) (A)	External statistics 2010 (B)	Per cent captured (A/B)
Paid employment	870,521	1,010,000	86
Self-employment (non-agricultural and agricultural)	1,961,071[a]	2,230,000	88
Property	107,271	Not available	Not available
Pension	24,984	Not available	Not available
Investment (excluding interest)	7,927	Not available	Not available
Interest on savings	54,894	Not available	Not available
Private transfers	726,729	Not available	Not available
Other non-agricultural sources	581,458	Not available	Not available

Notes: [a]This consists of overlapping counts of 1,076,199 persons receiving non-agricultural self-employment income plus 1,150,865 persons receiving agricultural income. Unlike in Table 4.1, the figures reported in column A are *not* for non-overlapping categories; that is, it is possible for a respondent to be captured in terms of both 'paid employment' and 'self-employment and/or 'agricultural' income if the person does report multiple income sources. The external statistics derived from the LFS were provided for the two broad categories of 'paid employees' and 'self-employed' only, and so it was not possible to disaggregate the 'self-employed' category into agricultural and non-agricultural sub-groups for the external statistics.

Source: Column A: 2010 LCMS prepared as the input dataset for MicroZAMOD (figures derived from income source questions). Column B: Figures derived by interpolating between LFS 2008 and LFS 2012 (with interpolations calculated by ZIPAR).

Table A3: Aggregate annual amounts of various types of market income, 2010

Income type	Input dataset (2010 LCMS) (ZMW million) (A)	External statistics 2010 (ZMW million) (B)	Per cent captured (A/B)
Paid employment	15,242	18,157	84
Self-employment (non-agricultural)	5,271	25,078	26
Agriculture	1,300		
Property	861	Not available	Not available
Pension	373	Not available	Not available
Investment (excluding interest)	10	Not available	Not available
Interest on savings	187	Not available	Not available
Private transfers	1,881	Not available	Not available
Other non-agricultural sources	1,954	Not available	Not available

Notes: The figure for self-employed income is derived from self-employed turnover as reported in the LCMS. Net self-employed income for those with turnovers over ZMW 800,000 per year is assumed to be 0.650 of self-employed

turnover (with ratio derived from LFS), whereas net self-employed income for those with self-employment turnover of less than ZMW 800,000 per year is assumed to be 0.581 of self-employed turnover (with ratio again derived from LFS).

Source: Column A: 2010 LCMS prepared as the input dataset for MicroZAMOD. Column B: Figures derived by ZIPAR by interpolating between LFS 2008 and LFS 2012 to estimate average income per person, separately for employed and self-employed, and aggregating these average values by the estimated numbers of paid employees and self-employed as presented in Table 4.1.

Table A4: Number of recipients of various types of non-simulated benefits/number of payers of non-simulated taxes (external data not available)

Table A5: Aggregate yearly amounts of various types of non-simulated benefits/ non-simulated taxes in the input dataset and external statistics (external data not available)

Table A6 Tax and benefit instruments simulated in MicroZAMOD—Number of recipients/ payers, June 2015

Tax–benefit policy	MicroZAMOD 2015 (A)	External 2015 (B)	Per cent captured (A/B)
Turnover tax	2,102,396	Not available	/
Personal income tax	334,518	Not available	/
VAT	N/A	N/A	N/A
Excise duty	N/A	N/A	N/A
SCT (h/h)	372,453	180,261	207
Employee pension contribution	870,229	701,374	124
Employer pension contribution	870,229	701,374	124

Source: Column A: MicroZAMOD. Column B: For SCT, Department of Social Welfare (2016: 1); for pension contributions, data provided by NAPSA for 2015 on request.

Table A7 Tax and benefit instruments simulated in MicroZAMOD—Annual amounts (ZMW), 2015

Tax–benefit policy	MicroZAMOD 2015 (A)	External 2015 (B)	Per cent captured (A/B)
Turnover tax	1,288,112,896	10,005,146,000[a]	68
Personal income tax	5,496,217,600		
VAT	1,470,719,360	8,365,284,000	18
Excise duty	154,381,904	3,253,882,000	5
SCT	358,913,568	123,000,000	292
Employee pension contribution	1,746,987,520	1,269,327,397	138
Employer pension contribution	1,746,987,520	1,269,327,397	138

Notes: [a]This figure comprises 2,561,021,000 for 'Other income tax—withholding tax' plus 7,444,125,000 for 'PAYE', and includes property transfer tax which is not included in Column A. For more details see Section 4.1.2.

Source: Column A: MicroZAMOD. Column B: MoF (2016: 28, 30); for pension contributions, data provided by NAPSA for 2015 on request.

Table A8 Inequality in Zambia, June 2015

	MicroZAMOD (A)	External statistics (B)
Gini coefficient 2015	0.75	0.69

Notes: Both coefficients use per capita equivalization, following the approach adopted in the 2015 LCMS report. The 2015 LCMS report states 'Household income presented in this chapter is based on the estimated 2,944,477 households in Zambia that reported non-zero income' (CSO 2016: 77). The figures presented in this table from the simulated MicroZAMOD outputs do not exclude zero income households.

Source: Column A: Gini coefficient calculated using simulated outputs from MicroZAMOD for June 2015. Column B: CSO (2016: 82).

Table A9 Poverty rates in Zambia, June 2015

	MicroZAMOD 2015 (A)	External statistics 2015 (B)	Ratio (A/B)
Lower-bound poverty line	59.2%	40.8%	1.45
Upper-bound poverty line	66.3%	54.4%	1.22

Notes: Lower-bound ('extreme' only) poverty line (adult equivalent): ZMW 152 per month; Upper-bound ('moderate + extreme') poverty line (adult equivalent): ZMW 214 per month (CSO 2016: 103). MicroZAMOD figures are based on disposable income, whereas CSO figures are based on consumption expenditure. Both sets of figures use an adult equivalent method of equivalization, as per the guidance from CSO.

Source: Column A: Simulated output from MicroZAMOD for June 2015. Column B: CSO (2016: 105).