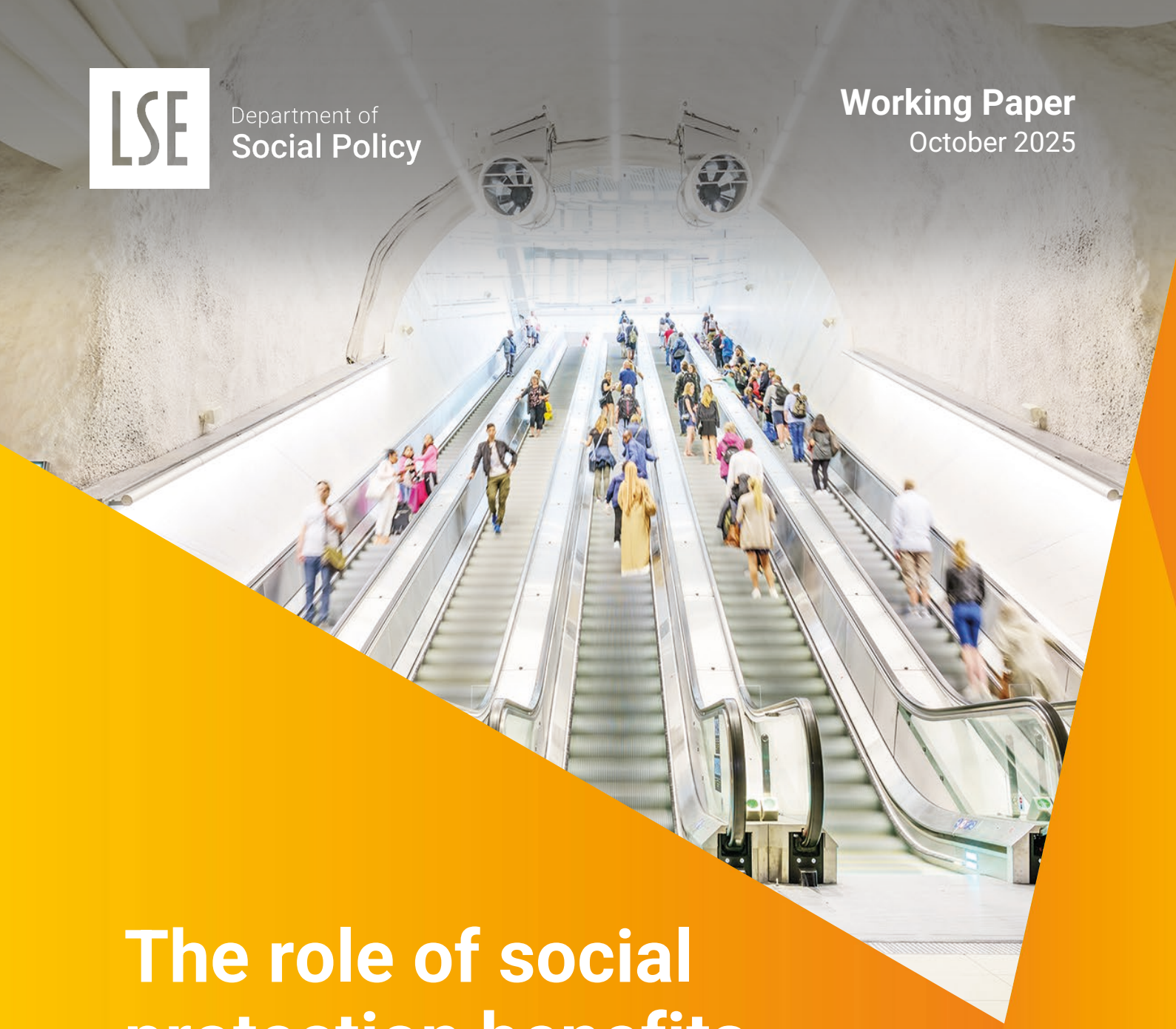

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The role of social protection benefits during crisis:

Evidence from Sub-Saharan Africa*

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The role of social protection benefits during crisis: Evidence from Sub-Saharan Africa*

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Abstract

The effectiveness of social protection during economic shocks depends on two types of benefit: non-shock-responsive benefits, fixed prior to crisis, and automatic stabilisers, which adjust with income or employment losses. We analyse effectiveness in seven Sub-Saharan African countries using tax-benefit microsimulation models and household survey data. Simulating employment losses, we apply a decomposition framework to isolate the role of each benefit type. We find that high pre-crisis coverage of non-shock-responsive benefits in Ghana and Zambia and income-related automatic stabilisers in South Africa provide an income floor for poor households. South Africa's unemployment insurance further mitigates losses among better-off households. In contrast, limited protection is available in Mozambique, Rwanda, Tanzania, and Uganda, where benefits are modest, coverage gaps substantial, and automatic stabilisers ineffective due to absent unemployment insurance, reliance on proxy means-tests, and narrow eligibility.

JEL codes: D31, H55, I3

Keywords: social protection benefits, non-shock-responsive benefits, automatic stabilisers, economic shocks, poverty

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1 Introduction

Social protection systems are a primary instrument for smoothing household consumption during economic shocks such as pandemics, commodity price collapses, and climate-related disasters. Yet despite being more exposed to these risks than other regions, social protection systems in Sub-Saharan Africa are thought to be relatively underdeveloped (Bowen et al. 2020). Previous studies have documented the role of benefits during recessions in reducing household income volatility (Dolls et al. 2012; Fernández Salgado et al. 2014), mitigating poverty increases (Bitler and Hoynes 2016), and reducing inequality (Paulus and Tasseva 2020), all for high-income countries. In contrast, for low- and middle-income countries — particularly in Sub-Saharan Africa — the literature has focused on specific programmes, rather than assessing entire benefit systems and whether they function as automatic stabilisers during economic shocks (e.g. Bastagli et al. 2016; World Bank 2022).

This paper provides the first evidence on the effectiveness of different benefit designs in Sub-Saharan African countries in cushioning the impact of economic shocks on household incomes, consumption, and poverty. We study seven diverse countries: Ghana, Mozambique, Rwanda, South Africa, Tanzania, Uganda, and Zambia. We incorporate tax-benefit microsimulation models (SOUTHMOD and SAMOD models) and nationally representative household surveys into a decomposition framework. We expand the decomposition framework of Bargain and Callan (2010) and Paulus and Tasseva (2020) to distinguish between two types of benefit design.

The first is *non-shock-responsive benefits* with entitlements fixed prior to a crisis, such as universal or proxy means-tested benefits. Proxy means-testing is based on observable household characteristics correlated with income (e.g. presence of children, disabled persons, or pregnant women) rather than income itself. The second is *automatic stabilisers*, which adjust automatically with changes in employment or earnings, such as unemployment insurance or income-related means-tested benefits with eligibility linked to household incomes. Thus, we distinguish between baseline protection by existing benefit entitlements prior to the shock and the adaptive capacity of systems through automatic adjustment. This extension is an important step in Global South countries where most

benefits are not designed as automatic stabilisers, but may still play an important role in mitigating the effects of crisis by providing an income floor.

Tax-benefit models for high-income countries have long been used in fiscal and distributional analysis (e.g. see Figari et al. 2015 for a literature review) but until recently their use for low- and middle-income countries has been limited largely due to data limitations.[1] Using these new models and household survey data, we calculate household benefit entitlements, tax liabilities, and net incomes in the baseline, 2019. We then stress-test the benefit systems (Atkinson 2009) by simulating hypothetical employment losses leading to reductions in aggregate household earnings by 10%, 30%, and 50%. We thus create a controlled experiment (Bourguignon and Spadaro 2006) to isolate the effect of non-shock-responsive benefits vs automatic stabilisers on household net incomes, consumption, and poverty, holding all else constant.

A known limitation of tax-benefit models is that they typically ignore behavioural responses to changes in benefit entitlements such as adjustments in labour supply or benefit take-up, or macroeconomic feedback effects (Figari et al. 2015; Bourguignon and Spadaro 2006). This is irrelevant if there are no such effects or they are small in magnitude. But if large, analysis using these models can only inform about the direct effects of benefit changes, rather than the total impact including behavioural responses. Nevertheless, these models are a powerful tool for creating counterfactual scenarios and thereby assessing the resilience of systems to shocks (Atkinson 2009). Moreover, while survey data quality in Sub-Saharan Africa varies, we restrict our analysis to the highest-quality household data which underpin the SOUTHMOD and SAMOD models (Gasior et al. 2021). These data underpin official statistics on poverty and inequality, as well as the World Bank's Poverty and Inequality Platform and Our World in Data. Lastly, the tax-benefit simulations and survey data are harmonised across countries, so our framework enables meaningful cross-country comparisons of social protection benefit systems (McLennan et al. 2021; Lastunen

[1] A few papers have used the SOUTHMOD models for African countries, e.g. Decoster et al. (2019), Bargain et al. (2021), Gasior et al. (2021), and Lastunen et al. (2024). However, differently from our paper, they look at the distributional impact of existing or hypothetical tax and benefit policies rather than assessing the resilience of benefit systems to shocks. We also study a wider set of countries compared to these papers, with the exception of Lastunen et al. (2024).

et al. 2024).

Our choice of countries is determined by the availability of high-quality survey data and tax-benefit models but also reflects a range of economic circumstances and benefit designs. South Africa, an upper-middle-income country, spends 2.6 times the Sub-Saharan Africa average of 2.1% of GDP on social protection; Ghana and Tanzania are lower-middle-income countries, while Mozambique, Rwanda, Uganda and Zambia, are low-income countries, all of which spend less than the regional average (ILO, 2021). Only South Africa and Mozambique have benefits designed as automatic stabilisers – an unemployment insurance in the former and income-related means-tested benefits in both. All other countries have a range of non-shock-responsive benefits only, either universal within a particular group such as the elderly and/or targeted at poor households via a proxy means-test.

Previous studies on African countries show that social protection benefits improve households' capacity to withstand shocks by increasing assets and productive investments (Jensen et al. 2017; Hidrobo et al. 2018), reducing adverse impacts on consumption (Gao and Mills 2018) and poverty (Devereux 2002; Lustig 2022), (see Bastagli et al. (2016) and Bowen et al. (2020) for comprehensive reviews). Our paper is closer to a set of studies using income decomposition and microsimulation methods, primarily in high-income countries, to estimate either the contribution of benefits to household incomes, and their impact on poverty and inequality (Bruckmeier et al. 2021; Christl et al. 2024; Cantó et al. 2021; Fernández Salgado et al. 2014), or to isolate the effect of automatic stabilisers (Brewer and Tasseva 2021; Paulus and Tasseva 2020; Dolls et al. 2012). A handful of papers in this tradition have looked at the effect of automatic stabilisers in African countries either during Covid-19 (Lastunen et al. 2021) or by simulating hypothetical income shocks for a narrower set of countries (Adu-Ababio 2024).[2] We expand the literature by providing insight into the role of benefit systems not only for redistribution, but also in smoothing household income and consumption losses during crises and in the economic and social

[2]Differently from these studies, we consider the role of non-shock responsive benefits and account for the important role of unemployment insurance as an automatic stabiliser in South Africa. Furthermore, Adu-Ababio (2024) focuses on Ghana, South Africa and Ecuador, while we examine a broader set of African countries.

context of Sub-Saharan Africa.

Our findings highlight significant differences in the effectiveness of social protection policies across countries. First, the high pre-crisis coverage of non-shock-responsive benefits in Ghana and Zambia provide an income floor for recipient households, acting as effective insurance mechanisms. In contrast, households in Mozambique, Rwanda, Tanzania, and Uganda receive limited protection due to modest benefit payments and substantial coverage gaps.

Second, automatic stabilisers are effective only in South Africa. Income-related automatic stabilisers, particularly child benefits, play a dual role. They provide near-universal coverage to poor households with children in the baseline, effectively functioning as a pre-existing income floor, similar to non-shock-responsive benefits. When the shock hits, they expand further to previously non-poor households with children who become newly eligible due to income loss. However, households without children, even if newly poor, remain largely unprotected. The unemployment insurance benefit effectively supports newly unemployed formal workers but excludes informal workers, who make up a non-negligible share of the labour force. Thus, while both types of automatic stabilisers in South Africa scale up during a crisis, eligibility criteria based on household composition or employment formality limit their reach. In the remaining countries, automatic stabilisers are ineffective due to the absence of unemployment insurance, reliance on income proxies instead of actual income, and/or narrow eligibility rules.

Our results are robust across varying employment reduction scenarios, suggesting that the effectiveness of benefit systems in mitigating crisis impacts remains relatively stable as shock severity increases.

Our findings highlight both the strengths and limitations of benefit systems in Sub-Saharan Africa. In the USA and Europe, automatic stabilisers – particularly unemployment insurance and income-related benefits – replace between less than 10% (the USA, Eastern and parts of Southern Europe) and up to 62% (Denmark) of lost earnings during economic downturns (Dolls et al. 2012). In comparison, we estimate 14% earnings replacement in South Africa under a similarly sized shock, placing it close to the EU av-

erage. However, the remaining countries in our sample – Ghana, Mozambique, Rwanda, Tanzania, Uganda, and Zambia – lack scalable stabilisers of this kind, and their capacity to buffer household incomes during large-scale shocks is therefore considerably more limited. Nonetheless, we show that even modest, non-shock-responsive benefits with broad pre-crisis coverage such as in Ghana and Zambia can provide an important safety net, though not strong enough to prevent crisis-induced increases in poverty. These results underscore the importance of designing more comprehensive and responsive benefit systems in Sub-Saharan Africa to better prepare for future crises.

The remainder of the paper is structured as follows. Section 2 describes the policy context for assessing the shock responsiveness of benefit systems. Section 3 discusses the data and methods. Section 4 presents the results. Section 5 concludes.

2 Policy context for assessing shock responsiveness

The seven countries in our analysis make up 23.5% of the population in Sub-Saharan Africa: Rwanda (13.1 million), Zambia (18.9), Mozambique (31.2 million), Ghana (32.2 million), Uganda (44.4 million), South Africa (58.8 million), and Tanzania (61.7 million). While differing in income levels and government capacity, they share several common challenges – low average social protection spending, young populations, and widespread informal employment.

Despite these constraints, social protection systems in these countries have expanded substantially since the early 2000s. Originally limited in scope – serving primarily civil servants or formal workers – programmes have increasingly targeted broader segments of the population, particularly the poor and vulnerable. Examples include Ghana's LEAP programme, Zambia's nationwide rollout of the Social Cash Transfer, Mozambique's Basic Social Subsidy, and Uganda's Senior Citizens Grant.

However, social protection spending levels remain low in most countries. South Africa stands out, spending 5.5% of GDP on social protection compared to a regional average of 2.1%. In contrast, all other countries spend well below this average. Table A.1 presents summary indicators for each country, including median age, life expectancy at birth, GDP

per capita and social protection expenditure as a share of GDP.

Table 1 summarises the main social protection programmes we examine in each country. We categorise these into two broad types based on their responsiveness to income or employment shocks: The first is *non-shock-responsive benefits*, including universal transfers (e.g. child and old-age benefits), social insurance pensions, and proxy means-tested transfers where eligibility is based on characteristics that correlate with income (e.g. presence of children, disability, food insecurity) rather than income itself. The second type is shock-responsive benefits or *automatic stabilisers*, which adjust in value or coverage when household incomes fall – such as unemployment insurance (UI) or income-related means-tested benefits with entitlements based on actual income or employment status.

Eligibility rules vary widely across countries. For example, Mozambique's Basic Social Subsidy and South Africa's grants are income-related and thus capable of expanding during a downturn. UI only exists in South Africa (with a small programme in Tanzania not captured in our data), making South Africa unique in combining income-related benefits with a UI system. By contrast, Uganda's main programme is universal within the elderly (aged 65+), while proxy means-testing dominates in Ghana, Tanzania, and Zambia. In the latter three countries, eligibility for social transfers is based on vulnerability assessments or proxies, and is only assessed every few years (e.g. every three years for the Productive Social Safety Net in Tanzania), making benefits less responsive to sudden changes in income.

While our focus is primarily on the mitigating role of benefits during crisis, direct taxes such as personal income tax and social insurance contributions (SIC) can also act as automatic stabilisers, cushioning income and consumption losses (Kniesner and Ziliak 2002; Brewer and Tasseva 2021). Therefore, we also look at their role. All countries have personal income taxes and social insurance contributions (SIC) which we assess in our analysis. Income tax schedules are broadly progressive, i.e. tax liabilities increase with gross (pre-tax) market income, while SIC are levied as a proportional tax. Thus, as earnings drop due to a shock, tax liabilities and SIC amounts fall, reducing the drop in after-tax income.

In the next section, we discuss both the harmonised tax-benefit microsimulation models (SOUTHMOD and SAMOD) and household survey data in our analysis.

[insert Table 1 here]

3 Methodology and data

3.1 Survey data and tax-benefit models

We use nationally representative household survey data from seven Sub-Saharan African countries combined with tax-benefit microsimulation models.[3] The tax-benefit models use reported gross incomes, consumption and individual and household characteristics from the survey data to simulate tax liabilities, benefit entitlements, and net income by applying country-specific tax and benefit rules. The surveys are considered to be of high quality and form the basis of official poverty and inequality statistics, including those reported in the World Bank's Poverty and Inequality Platform and Our World in Data. Our baseline corresponds to the year 2019; survey income and consumption data were uprated by CPI to reflect 2019 conditions.

We use the SAMOD tax-benefit model for South Africa and the new SOUTHMOD models for the other countries. All models are built on the EUROMOD framework – originally developed for tax-benefit microsimulation in the European Union and the UK (Sutherland and Figari, 2013) – and have been extended to the Sub-Saharan African context (Decoster et al., 2019). Both the input survey data and the tax-benefit simulations are harmonised to enable cross-country comparisons (McLennan et al., 2021). The models contain the tax-benefit rules of countries starting from the 2010s. The models use survey reports on (self-)employment, earnings, consumption and household and individual characteristics to calculate each household's direct tax liabilities, SIC payments, social protection benefits, and net income. Crucially, they allow us to simulate hypothetical

[3]The 2017 Ghana Living Standards Survey; 2015 Household Budget Survey (Inquérito sobre o Orçamento Familiar, IOF) for Mozambique; 2016/17 Integrated Household Living Conditions Survey for Rwanda; 2017 National Income Dynamics Study for South Africa; 2017/18 Household Budget Survey for Tanzania; 2016/17 National Household Survey for Uganda; and the 2015 Living Conditions Monitoring Survey for Zambia.

reductions in employment and earnings and examine the resulting impacts on outcomes such as poverty and disposable income.

We report estimates for both income and consumption poverty. Household net income is calculated as gross market income (from employment, self-employment, agriculture, rent, investment, and private transfers) plus social protection benefits, minus direct income taxes and SIC. Household consumption expenditure, as reported in the surveys, includes the market value of goods and services purchased, received as gifts or in-kind payments, or derived from own production. In our shock scenarios, we adjust household consumption in line with changes in net income, using a Marginal Propensity to Consume (MPC), i.e. the share of income change passed through to consumption. MPCs are expected to be high for credit-constrained households with limited access to borrowing or liquid assets, as is typical in the populations we study. Empirical evidence also suggests high MPCs in Sub-Saharan Africa (see e.g. Bengtsson (2012)). Consistent with this, we assume an MPC of one, meaning that all income gains are consumed and none are saved. Details of our simulation are provided in the Supplementary Materials C.

Table 2 presents summary statistics by vulnerability groups and key socio-economic and demographic characteristics for the seven countries in our analysis. We classify vulnerability groups according to World Bank poverty line definitions: the international (extreme) poverty line of $2.15 per day (2017 prices), lower-middle-income (LMI) poverty line of $3.65, and upper-middle-income (UMI) poverty line of $6.85).[4] South Africa has the lowest poverty rate where less than a third of the population is in the bottom two vulnerability groups, i.e. either 'extremely poor' or 'LMI poor'. The same figure for Ghana is nearly half, while it is more than two thirds in the other countries. As anticipated, earners are less likely to be in the 'extremely poor' group and more likely to have informal sources from (self-)employment and agriculture except again in South Africa where formal employment is more prevalent. The populations are young with more than half being under 30 years old, and less than 10% are aged 60 and over. In most countries,

[4]The poverty line definitions refer to living standards in 2017 and are uprated for country-specific changes in Purchasing Power Parities (PPP) from 2017 to 2019. PPP conversion factors and changes in consumer price index from 2017 to 2019 are from the World Bank's World Development Indicators database.

the majority of households have three or more children under age 18. South Africa again stands out, with only about one-third of households falling into this category.

[insert Table 2 here]

3.2 Assessment of social protection performance

Our goal is to measure the income and consumption protection provided by benefits during crisis that strikes the economy as a whole. To measure the extent to which benefits cushion income and consumption losses, we consider a range of measures, including Net Replacement Rates, changes in household net income, income and consumption poverty, benefit coverage and average benefit amounts.

We expand the decomposition approach of Bargain and Callan (2010) and Paulus and Tasseva (2020) to separate the effects of benefits into non-shock-responsive benefits and automatic stabilisers. Formally, in the pre-crisis baseline scenario let us denote with y^B household gross (pre-tax) market incomes; t^B household income tax plus SIC; b^B_{nrb} household non-shock-responsive benefits and b^B_{as} benefit automatic stabilisers. Household net income Y^B and household consumption C^B are then:

$$Y^B = y^B - t^B + b^B_{nrb} + b^B_{as} \tag{1}$$

$$C^B = c_0 + c_1 Y^B \tag{2}$$

where c_0 is consumption that is independent of people's income and c_1 is the marginal propensity to consume (MPC), i.e. the effect of an additional unit of income on consumption.

A negative shock (crisis) strikes which raises unemployment and lowers aggregate household earnings so that household gross market income after the shock is y^S ($y^S \ll y^B$); tax liabilities and SIC as automatic stabilisers respond to the loss of earnings and become t^S; benefit automatic stabilisers also respond to the changes in earnings, tax liabilities and SIC and become b^S_{as}; while entitlements to non-shock-responsive benefits remain the

same as in the baseline, b^B_{nrb}. Household disposable income and consumption as a result of the shock are:

$$Y^S = y^S - t^S + b^B_{nrb} + b^S_{as} \tag{3}$$

$$C^S = c_0 + c_1 Y^S \tag{4}$$

Net Replacement Rates: To assess the extent to which benefits replace baseline income, we estimate Net Replacement Rates (R) equal to the ratio between crisis and baseline household net income:

$$R = \frac{Y^S}{Y^B} = \frac{y^S - t^S + b^B_{nrb} + b^S_{as}}{Y^B} \tag{5}$$

R measures the proportion of household's baseline income that is maintained after job loss and benefits receipt. In particular, $\frac{b^B_{nrb}}{Y^B}$ and $\frac{b^S_{as}}{Y^B}$ capture the contribution of non-shock responsive benefits and benefit automatic stabilisers, respectively – the higher the two ratios, the more income cushioning provided by benefits during crisis.

Impact on household net income: We estimate the change in household net income due to crisis (ΔY), breaking it down into the contribution of benefit automatic stabilisers (Δb_{as}), taxes and SIC automatic stabilisers (Δt) as well as changes to gross market incomes (Δy):

$$\Delta Y = Y_S - Y_B = (y^S - y^B) + (t^B - t^S) + (b^S_{as} - b^B_{as}) = \Delta y + \Delta t + \Delta b_{as} \tag{6}$$

where Δb_{as} captures the mitigating role of benefit automatic stabilisers through increased benefit coverage and benefit amounts. In comparison, entitlements to non-shock-responsive benefits are independent of the shock and do not offset earnings losses.

Impact on income and consumption poverty: As poverty reduction is a key goal of social protection, we quantify the impact of crisis on poverty and the effectiveness of benefits to mitigate poverty increases due to crisis. We apply an approach commonly used

in distributional analysis and official poverty statistics by comparing poverty estimates using alternative resource definitions – i.e. using net income versus income before benefits but after taxes and SIC:

$$\begin{aligned}\Delta P^{B,Y} &= \underbrace{P[y^B - t^B + b^B_{nrb} + b^B_{as}]}_{\text{baseline poverty using net income}} - \underbrace{P[y^B - t^B]}_{\text{baseline poverty using net income before benefits}} \\ \Delta P^{S,Y} &= \underbrace{P[y^S - t^S + b^B_{nrb} + b^S_{as}]}_{\text{crisis poverty using net income}} - \underbrace{P[y^S - t^S]}_{\text{crisis poverty using net income before benefits}}\end{aligned} \tag{7}$$

where P is the poverty measure and $\Delta P^{B,Y}$ and $\Delta P^{S,Y}$ is the income poverty reduction due to benefits in the baseline and during crisis, respectively. Our poverty measure is the poverty headcount, which is the share of the population living below the poverty line. The poverty line is the international poverty definition of international-$2.15 per day (in 2017 prices).

Using equations 2 and 7 we can similarly approximate the impact of benefits on consumption poverty in the baseline and during crisis:

$$\begin{aligned}\Delta P^{B,C} &= \underbrace{P[c_0 + c_1(y^B - t^B + b^B_{nrb} + b^B_{as})]}_{\text{baseline poverty using consumption}} - \underbrace{P[c_0 + c_1(y^B - t^B)]}_{\text{baseline poverty using consumption before benefits}} \\ \Delta P^{S,C} &= \underbrace{P[c_0 + c_1(y^S - t^S + b^B_{nrb} + b^S_{as})]}_{\text{crisis poverty using consumption}} - \underbrace{P[c_0 + c_1(y^S - t^S)]}_{\text{crisis poverty using consumption before benefits}}\end{aligned} \tag{8}$$

We then compare the poverty-reducing effect of benefits during crisis and the baseline to capture the extent to which benefits mitigate the increase in poverty due to the shock:

$$\begin{aligned}M^Y = \Delta P^{S,Y} - \Delta P^{B,Y} = \\ \underbrace{P[y^S - t^S + b^B_{nrb} + b^S_{as})] - P[y^S - t^S]}_{\text{impact of benefits on income poverty during crisis}} - \\ \underbrace{(P[y^B - t^B + b^B_{nrb} + b^B_{as}] - P[y^B - t^B])}_{\text{impact of benefits on income poverty in baseline}}\end{aligned} \tag{9}$$

$$M^C = \Delta P^{S,C} - \Delta P^{B,C} =$$

$$\underbrace{P[c_o + c_1(y^S - t^S + b^B_{nrb} + b^S_{as})] - P[c_o + c_1(y^S - t^S)]}_{\text{impact of benefits on consumption poverty during crisis}} - \tag{10}$$

$$\underbrace{(P[c_o + c_1(y^B - t^B + b^B_{nrb} + b^B_{as})] - P[c_o + c_1(y^B - t^B)])}_{\text{impact of benefits on consumption poverty in baseline}}$$

where $M^x < 0$ implies greater poverty reduction during crisis than in the baseline; $M^x = 0$ implies the same poverty reduction during crisis and in the baseline; and $M^x > 0$ means benefits are less effective in reducing poverty during crisis than in the baseline.

3.3 Simulation of shocks

To measure the extent to which social protection benefits respond to an adverse shock and cushion its effect on incomes and consumption, we stress-test the benefit system (Atkinson, 2009). Similar to Dolls et al. (2012) for EU countries and the USA, we simulate an employment shock leading to some earners losing all of their earnings. We focus on employment shocks as these are a feature of a broad type of crises, e.g. Covid-19 pandemic, financial crises, natural disasters, and climate shocks.

We allocate the employment shocks as follows. First, households are allocated into one of the five vulnerability groups according to per capita household consumption (income in South Africa) relative to the internationally defined poverty lines. An earner is then selected at random within each vulnerability group and by sex and their earnings set to zero. This process is repeated within each group until the aggregate earnings reduction within group is 30% of group earnings. In robustness checks, we also simulate shocks leading to losses in aggregate household earnings of 10% and 50%. We count earnings as the sum of earnings from employment, self-employment, and agricultural income. Further details of the implementation of this process are in Table A.3.

There are several advantages of simulating hypothetical shocks over observing actual crisis episodes. It allows us to create a controlled experiment (Bourguignon and Spadaro 2006) to isolate the effect of non-shock-responsive benefits and automatic stabilisers from

potential interactions with discretionary government response during actual crisis. For example, during the Covid-19 pandemic, benefits for children in Ghana (School Feeding Programme) and Zambia (Home Grown School Meal Programme) were temporarily suspended by the government, limiting their response and our ability to understand their effectiveness (Lastunen et al. 2021). Furthermore, simulating shocks of the same nature and size allows us to assess cross-country differences in benefit protection. Varying the size of the shock also allows us to determine if the severity of crisis matters for benefit effectiveness to cushion income and consumption losses.

4 Results

We structure the results in two subsections. The first documents benefit coverage and average benefit amounts, and examines how they adjust in response to simulated earnings shocks. The second evaluates how benefits protect household incomes and mitigate poverty increases under these shocks. We also study the responsiveness of benefit systems to shocks of varying magnitudes (10% and 50% drop in aggregate earnings), which we include in the Supplementary Materials and refer to below.

In each subsection, we report estimates for the full population and for key demographic subgroups defined by baseline economic vulnerability, earner status, age, gender, employment formality, and household composition. This allows us to assess whether and how benefit systems protect different types of households from crisis-induced income and welfare losses.

4.1 Benefit coverage and amounts received

Table 3 shows the benefit coverage rate, i.e. the share of individuals living in households receiving social protection benefits by population group and for each country. We focus on the sample of households affected by the shock. Benefit coverage is highest in South Africa (60.3% of the shock-affected population), Ghana (52.9%) and Zambia (49.5%). In contrast, the coverage rate is less than 10% in Mozambique, Rwanda, Tanzania, and

Uganda. Benefit coverage tends to be higher among the 'extremely poor' and 'LMI poor'; the youngest, under 18, age group and/or the oldest, 60+, group; and informal workers. Benefit coverage increases with the number of under-18-year-olds in the household except in Rwanda and Uganda where benefits are highly skewed towards the 60+ age group. Benefits tend to be equally distributed among women and men except in South Africa where the coverage rate is higher among women. Lastly, female-headed households are more likely than male-headed households to receive benefits in Rwanda, South Africa, Tanzania, Uganda, and Zambia, and less likely in Ghana.

Table 3 also reports the change in benefit coverage due to our simulated earnings shock. Automatic stabilisers are shown to respond to the shock only in Mozambique and South Africa by expanding coverage to newly vulnerable households. The increase is small in Mozambique (1.5% points or 17.2% of the baseline), and driven by a small increase in the numbers eligible for the Basic Social Subsidy Programme (not presented). In contrast, the increase is substantial in South Africa (25.7% points or 42.6% of the baseline), and primarily due to an expansion of the UI benefit and to a lesser extent income-related benefits such as the child grant (not presented). Overall, even with the coverage expansion, nearly 90% of those hit by the shock in Mozambique are not reached by any benefits, compared to 14% in South Africa.

Appendix Table A.4 shows further details of benefit coverage for South Africa by presenting numbers separately for income-related benefits and UI. While most families targeted by the income-related benefits in the bottom three vulnerability groups already receive them in the baseline due to a relatively generous income test, coverage expands with crisis to households in the top two groups ('vulnerable' and 'non-vulnerable') who have experienced an earnings loss. Moreover, while UI coverage in the baseline is less than 0.5%, it expands substantially due to the shock, with the biggest increase in the top three vulnerability groups where most formal workers are located.

In Ghana, Rwanda, Tanzania, Uganda and Zambia, benefit coverage does not respond to the shock due to the absence of automatic stabilisation in benefits design and thus, the vast majority of households affected by the shock, but not in benefit receipt prior to it,

remain unprotected.

[insert Table 3 here]

Table 4 summarises the average benefit amount per person, calculated as the product of the share of individuals receiving the benefit (coverage) and the average benefit received among recipients. Amounts are presented relative to the international poverty line. The highest payments are in South Africa where the average benefits received are equivalent to 45.3 times the international poverty line. Benefits received are substantially lower elsewhere with the equivalent numbers being 8.1 in Ghana, 4.6 in Zambia, 2.4 in Mozambique, and equal or less than the poverty line in Rwanda, Tanzania, and Uganda.

The subgroup analysis shows that benefit payments tend to favour older individuals, with the highest average benefit amounts received by those aged 60 and above in most countries. Tanzania is the exception, where benefit amounts are uniformly low across all age groups, reflecting generally limited coverage. These patterns align with the coverage estimates above.

Second, in Ghana, Mozambique, and Rwanda, the top two vulnerability groups (by baseline consumption) receive relatively higher benefit amounts, whereas in South Africa, Tanzania, Uganda, and Zambia, benefit levels are more strongly concentrated among the poorest groups. This contrast suggests more effective poverty targeting in the latter countries and a potential mismatch between programme design and need in the former.

Finally, estimates by gender broadly mirror the coverage patterns, with similar benefit amounts among men and women. However, by employment formality status average benefit amounts are higher among informal workers only in South Africa and Zambia, lower in Ghana, Mozambique, and Rwanda and the same in Uganda and Tanzania.

In response to the earnings shock, the average benefit amount increases only marginally in Mozambigue (0.1 ppt) but rises sharply in South Africa (112 ppt). This difference in response occurs as income-related benefits are paid at a flat rate in Mozambique and do not vary with income. Whereas in South Africa, Appendix Table A.5 shows that most of the benefit increase (103.5 times) is due to rise in UI entitlements, particularly for individuals aged 30-49 and 18-29, formal earners, male-headed households and households in the top

two vulnerability groups, entitled to more generous UI support. The remaining increase (8.5 times) comes from income-related benefits, such as the old age and disability grants, which automatically increase to cover the widening shortfall between reported income and the income-test threshold caused by the shock.

[insert Table 4 here]

4.2 Impact of crisis on household net incomes and poverty

Impact on household net incomes

We now ask to what extent the benefit patterns shown above translate into protection of household net incomes during the crisis. We estimate the effect of the shock on net incomes and the extent to which benefits offset these losses.

NRRs, defined in Section 3.2, capture the share of pre-shock income retained after the shock. A lower NRR indicates a greater loss in household income due to the crisis. Figure 1 presents NRRs (black circles) for each country and across baseline vulnerability groups. NRRs are further decomposed by income source (market incomes, automatic stabilisers, non-shock-responsive benefits, and income tax/SIC) with the sum of the bars equalling the total NRR.

Countries differ substantially in the extent to which their benefit systems protect the most vulnerable. In South Africa, NRRs are strongly progressive: the most vulnerable retain a higher share of their pre-shock income. For example, NRRs among the poorest (extremely poor) reach 96.5%, compared to 78.1% among the 'non-vulnerable'. Similar, though less pronounced, patterns are observed in Zambia (79.5% vs 72.0%) and Ghana (77.1% vs 69.5%). These differences are driven primarily by benefits – particularly higher coverage across all three countries, and more generous transfers in South Africa and Zambia for the poorest groups.

In contrast, in Mozambique, Rwanda, Tanzania, and Uganda, where benefit coverage and amounts were shown to be more limited, NRRs are lower among the most vulnerable group and show little variation across vulnerability groups. In the poorest ('extremely poor') group, NRRs are 69.7% in Mozambique, 71.1% in Rwanda, 72.8% in Tanzania,

and 73.4% in Uganda.

Figure 1 further decomposes NRRs by income source and shows that the relative importance of automatic stabilisers vs non-shock-responsive benefits is country- and group-specific. In South Africa, income-related benefit automatic stabilisers (purple bars) act as a substantial income floor for the poorest, accounting for 78% of baseline net income in the most vulnerable group compared to just 0.4% in the top 'non-vulnerable' group. By contrast, UI (green bars) primarily cushions better-off groups, contributing 5.8% and 3.4% of baseline net income for the 'vulnerable' and 'non-vulnerable' groups, but less than 0.5% for the 'extremely poor'. In Zambia and Ghana, only non-shock-responsive benefits (blue bars) offer meaningful protection – 17.9% and 6.7% of baseline net income, respectively, for the poorest group versus 0.3% and 1.5% in the top ('non-vulnerable') group. These patterns are consistent across shocks of 10% and 50% to household earnings (see Figure B.1), suggesting that shock size does not alter the relative importance of these benefit types.

[insert Figure 1 here]

Figure 2 presents changes and shows the percentage change in household net income resulting from the shock as defined in equation 6. The figure shows the total change in mean household net income (black circle) by country and baseline vulnerability group within each country. Again, we decompose the total by income source (the bars add up to the circle). By definition, the contribution of non-shock-responsive benefits to income *changes* is zero as entitlements remain unchanged after the shock.

We highlight three important patterns. First, in South Africa, and to a lesser extent in Zambia and Ghana, the loss in net income decreases with vulnerability, mirroring the NRR patterns. This is driven by the income floor provided by income-related automatic stabilisers in South Africa and non-shock-responsive benefits in Zambia and Ghana, which protect households already receiving support prior to the shock. In contrast, in Mozambique, Rwanda, Tanzania, and Uganda, where benefits offer limited protection, net income losses are broadly similar across vulnerability groups.

Second, the responsiveness of automatic stabilisers to earnings shocks varies widely across countries, reflecting differences in baseline coverage, eligibility rules, and target groups. In Mozambique, income-related benefits show little responsiveness due to low baseline coverage, strict eligibility, and small benefit amounts. In South Africa, baseline coverage among the main target group (poor households with children) is already near universal, so any responsiveness occurs mainly through expansion to newly poor households affected by the shock. In contrast, South Africa's UI expands significantly during the crisis, cushioning losses especially for the top two vulnerability groups where most formal workers are situated. However, informal workers, who are not entitled to UI and make up a non-negligible share of the labour force, remain unprotected.

Third, in all countries, income tax and SIC provide a modest stabilising effect, mainly for the top two vulnerability groups where most taxpayers are concentrated. Thus, with the exception of South Africa, benefit-based automatic stabilisers offer little cushioning, leaving income tax and SIC as the primary automatic stabilisers.

[insert Figure 2 here]

As a robustness check, we also estimated the income stabilisation coefficient (Dolls et al. 2012), which measures the proportion of gross earnings loss that is offset by higher entitlements to benefit automatic stabilisers and/or lower income tax and SIC liabilities. The results, presented in Appendix Figure B.3, are consistent with our main findings. They highlight the cushioning role of UI in South Africa, the modest responsiveness of income-related benefit automatic stabilisers in South Africa and Mozambique, and their near absence in the other countries.

Impact on poverty

We now assess the extent to which automatic stabilisers and non-shock-responsive benefits limit the rise in poverty caused by the simulated employment shock. Figure 3 presents four subfigures, each focusing on a different population subgroup, corresponding to equations 7–10. The left axis shows the baseline poverty headcount rate (dark blue bars) and the increase due to the shock (light blue bars, in percentage points). The right

axis shows the poverty-reducing effect of benefits, both non-shock-responsive benefits and automatic stabilisers, separately in the baseline (square) and during the crisis (diamond). The mitigation effect (circle) is also plotted, capturing the change in the poverty impact of benefits between the crisis and the baseline. Poverty is measured using household income for South Africa and consumption for all other countries.

Baseline poverty rates are lowest in South Africa (14.4%), followed by Ghana (25.1%), and at a much higher level of 44.5% in Tanzania and more than 50% in Mozambique, Rwanda, Uganda, and Zambia. By age, the highest poverty rate is in the under-18 group in all countries and rates also rise steeply with the number of under-18-year-olds in the household. Informal earners tend to have higher poverty rate than formal earners, due to lower earnings. While overall no substantial differences are observed between women and men across countries, female-headed households are more likely to be poor than male-headed households in South Africa (17% vs 10.1%) and less likely in Ghana (20% vs 27.2%).

The largest poverty reduction effect of benefits is 19.7% points (equivalent to 136.7%) in South Africa. Benefits in Ghana and Zambia come second, though with substantially smaller effect on poverty (2.5% points (9.8%) and 1.9% points (3.2%), respectively). The results for these three countries reflect the higher benefit coverage and more generous benefits. In Mozambique, Rwanda, Tanzania, and Uganda, benefits have a very small or negligible effect on poverty. By age, the largest poverty-reducing effect of benefits is among the 60+ as benefit systems tend to favour this demographic group in all countries except Tanzania where benefits are small and do not make any difference to poverty.[5] By formality, benefits tend to do more in reducing poverty among informal than formal earners in South Africa, Ghana, and Zambia. Benefits are also more effective in lowering poverty among households with a higher number of under-18-year-olds in South Africa and Ghana, and less effective in Zambia. In the other countries, we find no large differences in the poverty-reducing effects across different groups by gender and number of young

[5]In South Africa in particular, we estimate that the 60+ poverty rate is 45.4% based on household income before benefits and nearly abolished to less than 2% after adding benefits to household income. In comparison, in the under-18 group we estimate 42.6% before benefits vs 18% after.

people in the household.

Poverty always increases due to the simulated crisis, but benefits mitigate some of this increase in South Africa only. We estimate a poverty mitigating effect of 6.8% points for the overall population, with the highest effect for the 18-49 year-old groups and formal workers. This is primarily due to workers becoming entitled to UI. In all other countries, the benefits mitigating effect is negligible, i.e. benefits are not effective in offsetting the large poverty increases due to the shock. Even in Ghana and Zambia, with larger benefit systems than Mozambique, Rwanda, Tanzania, and Uganda, the coverage and level of non-shock-responsive benefits are not sufficiently high to prevent newly vulnerable households from falling into poverty.

[insert Figure 3 here]

5 Conclusions

While previous research has examined the income cushioning role of automatic stabilisers in high-income countries, evidence for low- and middle-income countries is scarce. This paper examines the effectiveness of benefit systems in seven Sub-Saharan African countries in cushioning household incomes, consumption and poverty during hypothetical employment shocks. Using harmonised tax-benefit models and household survey data, we distinguish between non-shock-responsive benefits, which provide baseline protection, and automatic stabilisers, which adapt to household income loss.

Our results show substantial heterogeneity across countries. In Ghana, Zambia, and South Africa, relatively broad benefit coverage before the crisis offers an income floor for households already in receipt. However, only in South Africa do benefits scale up during crisis, with unemployment insurance and income-related grants providing additional protection to households that become newly vulnerable. Elsewhere, particularly in Mozambique, Rwanda, Tanzania, and Uganda, modest benefit levels, strict eligibility rules, and reliance on proxy means-tests leave the majority of households unprotected when earnings collapse.

These findings carry two key policy implications. First, system size matters: where pre-crisis coverage is broader, benefits play an important insurance role even without explicit responsiveness to shocks. Second, design matters: scalable benefits, such as unemployment insurance and income-related benefits, are crucial to ensure that newly poor households are not left without support. Importantly, the two are interdependent. A flexible system with narrow coverage or very low benefit levels will remain ineffective, while a large system without adaptive design may fail to respond where protection is most needed.

Overall, our findings suggest that social protection systems in Sub-Saharan Africa can play a meaningful role in mitigating crisis impacts, but only where both baseline coverage and adaptive mechanisms are present. Strengthening fiscal capacity, broadening coverage of non-shock-responsive benefits, and developing scalable automatic stabilisers will be essential to enhance resilience against future economic, health, or climate-related shocks.

Our findings have limitations. First, household survey data on incomes and consumption are known to contain errors, which may bias our estimates of benefit entitlements, coverage, net incomes, and poverty. However, the data we use are considered the 'golden' benchmark in the countries studied, as they underpin official distributional and poverty statistics produced by governments and international organisations. Moreover, the SOUTHMOD and SAMOD tax-benefit calculations have been carefully validated against administrative data on benefit receipt. Second, our analysis focuses on seven countries and simulates an employment shock. While employment shocks are a common feature of many crises, including pandemics, financial downturns, and climate-related disasters, other types of shock (e.g. food price spikes or droughts) may generate different patterns of vulnerability and benefit response. Thus, future research could extend our framework to other shocks and countries. Nevertheless, our results provide unique insights into the role of benefits, both non-shock-responsive and automatic stabilisers, in cushioning households from large income losses.

References

Adu-Ababio, K. (2024). "Microsimulation Approaches to Studying Shocks and Social Protection in Selected Developing Economies." *Economic Analysis and Policy*, *84*, 1552–1576.

Adu-Ababio, K., Darko Osei, R., Pirttilä, J., and Rattenhuber, P. (2022). "SOUTHMOD country report Ghana - GHAMOD v2.5." *UNU-WIDER: Helsinki*.

Atkinson, A. B. (2009). "Stress-Testing the Welfare State." In B. Ofstad, O. Bjerkholt, K. Skrede, and A. Hylland (Eds.), *Rettferd og Politik Festskrift til Hilde Bojer*, 31–39, Emiliar Forlag.

Bargain, O., and Callan, T. (2010). "Analysing the Effects of Tax-benefit Reforms on Income Distribution: A Decomposition Approach." *Journal of Economic Inequality*, *8*(1), 1–21.

Bargain, O., Jara, H. X., Kwenda, P., and Ntuli, M. (2021). "Income Distribution and the Potential of Redistributive Systems in Africa: A Decomposition Approach." *Journal of African Economies*, *31*(4), 293–328.

Bastagli, F., Hagen-Zanker, J., Harman, L., Barca, V., Sturge, G., Schmidt, T., and Pellerano, L. (2016). "Cash transfers: what does the evidence say? A rigorous review of programme impact and of the role of design and implementation features." *ODI Report*.

Bengtsson, N. (2012). "The Marginal Propensity to Earn and Consume out of Unearned Income: Evidence Using an Unusually Large Cash Grant Reform." *The Scandinavian Journal of Economics*, *114*(4), 1393–1413.

Bitler, M., and Hoynes, H. (2016). "The More Things Change, the More They Stay the Same? The Safety Net and Poverty in the Great Recession." *Journal of Labor Economics*, *34*(S1), S403–S444.

Bourguignon, F., and Spadaro, A. (2006). "Microsimulation as a tool for evaluating redistribution policies." *The Journal of Economic Inequality*, *4*, 77–106.

Bowen, T., Ninno, C. D., Andrews, C., Coll-Black, S., Gentilini, U., Johnson, K., Kawasoe, Y., Kryeziou, A., Maher, B., and Williams, A. (2020). "Adaptive Social Protection. Building Resilience to Shocks. International Development in Focus." *The World Bank*.

Brewer, M., and Tasseva, I. V. (2021). "Did the UK Policy Response to Covid-19 Protect Household Incomes?" *The Journal of Economic Inequality*, *19*, 433–458.

Bruckmeier, K., Peichl, A., Popp, M., Wiemers, J., and Wollmersh´auser, T. (2021). "Distributional effects of macroeconomic shocks in real-time." *The Journal of Economic Inequality*, *19*, 459–487.

Cantó, O., Figari, F., Fiorio, C. V., Kuypers, S., Marchal, S., Romaguera-de-la Cruz, M., Tasseva, I. V., and Verbist, G. (2021). "Welfare Resilience at the Onset of the COVID-19 Pandemic in a Selection of European Countries: Impact on Public Finance and Household Incomes." *Review of Income and Wealth*, *n/a*(n/a).

Castelo, V., Castigo, F., Cardoso, J., Noble, M., Oliveira, R., and Wright, G. (2022). "SOUTHMOD country report Mozambique - MOZMOD v2.9." *UNU-WIDER: Helsinki*.

Christl, M., Poli, S. D., Figari, F., Hufkens, T., Leventi, C., Papini, A., and Tumino, A. (2024). "Monetary compensation schemes during the COVID-19 pandemic: implications for household incomes, liquidity constraints and consumption across the EU." *The Journal of Economic Inequality*, *22*, 411–431.

Crossley, T. F., Fisher, P., Levell, P., and Low, H. (2021). "MPCs in an Economic Crisis: Spending, Saving and Private Transfers." *Journal of Public Economics Plus*, *2*, 100005.

de Mahieu, A., Mukangango, J., Harerimana, T., Lastunen, J., Hakizimana, N., Karangwa, J., Nsabimana, A., Noble, M., and Wright, G. (2024). "SOUTHMOD country report Rwanda - RWAMOD v1.1." *UNU-WIDER: Helsinki*.

Decoster, A., Pirttilä, J., Sutherland, H., and Wright, G. (2019). "Editorial. SOUTHMOD: Modelling Tax-Benefit Systems in Developing Countries." *International Journal of Microsimulation;*, *12*(1), 1–12.

Devereux, S. (2002). "Can Social Safety Nets Reduce Chronic Poverty?" *Development Policy Review*, *20*(5), 657–675.

Dolls, M., Fuest, C., and Peichl, A. (2012). "Automatic Stabilizers and Economic Crisis: US vs. Europe." *Journal of Public Economics*, *96*(3), 279–294.

Fernández Salgado, M. n., Figari, F., Sutherland, H., and Tumino, A. (2014). "Welfare Compensation for Unemployment in the Great Recession." *Review of Income and Wealth*, *60*(S1), S177–S204.

Figari, F., Paulus, A., and Sutherland, H. (2015). "Microsimulation and Policy Analysis." In A. B. Atkinson, and F. Bourguignon (Eds.), *Handbook of Income Distribution*, vol. 2B, 2141–2221, Elsevier BV.

Gao, J., and Mills, B. F. (2018). "Weather Shocks, Coping Strategies, and Consumption Dynamics in Rural Ethiopia." *World Development*, *101*, 268–283.

Gasior, K., Leventi, C., Noble, M., Wright, G., and Barnes, H. (2021). "The Distributional Impact of Tax and Benefit Systems in five African countries." *International Journal of Sociology and Social Policy*.

Hidrobo, M., Hoddinott, J., Kumar, N., and Olivier, M. (2018). "Social Protection, Food Security, and Asset Formation." *World Development*, *101*, 88–103.

International Labour Organization (2021). "World Social Protection Report 2020-22: Social Protection at the Crossroads – In Pursuit of a Better Future." *International Labour Office – Geneva: ILO*.

Jensen, N. D., Barrett, C. B., and Mude, A. G. (2017). "Cash transfers and index insurance: A comparative impact analysis from northern Kenya." *Journal of Development Economics*, *129*, 14–28.

Kalikeka, M., Bwalya, M., Gasior, K., Mclennan, D., and Jouste, M. (2022). "SOUTHMOD country report Zambia - MicroZAMOD v2.12." *UNU-WIDER: Helsinki*.

Kniesner, T. J., and Ziliak, J. P. (2002). "Explicit Versus Implicit Income Insurance." *Journal of Risk and Uncertainty*, *25*(1), 5–20.

Lastunen, J., de Mahieu, A., Gasior, K., Jara, H. X., and Pirttilä, J. (2024). "Microsimulation of Tax-Benefit Systems in the Global South: A Comparative Assessment." *WIDER Working Paper 2024/35*.

Lastunen, J., Rattenhuber, P., Adu-Ababio, K., Gasior, K., Jara, X. H., Jouste, M., McLennan, D., Nichelatti, E., Oliveira, R. C., Pirttilä, J., Richiardi, M., and Wright, G. (2021). "The Mitigating Role of Tax and Benefit Rescue Packages for Poverty and Inequality in Africa amid the COVID-19 Pandemic." *WIDER Working Paper 148/2021*.

Leyaro, V., Kisanga, E., Noble, M., Wright, G., and Oliveira, R. (2022). "SOUTHMOD country report Tanzania - TAZMOD v2.5." *UNU-WIDER: Helsinki*.

Lustig, N. (Ed.) (2022). *Commitment to Equity Handbook: Estimating the Impact of Fiscal Policyon Inequalityand Poverty. Fiscal Incidence Analysis: Methodology, Implementation, and Applications.*, vol. 1. Brookings Institution Press: Washington, 2 edn.

McLennan, D., Noble, M., Wright, G., Barnes, H., and Masekesa, F. (2021). "Exploring the Quality of Income Data in two African Household Surveys for the Purpose of Tax-Benefit Microsimulation Modelling. Imputing Employment Income in Tanzania and Zambia." *WIDER Working Paper 2021/134*.

Paulus, A., and Tasseva, I. V. (2020). "Europe Through the Crisis: Discretionary Policy Changes and Automatic Stabilizers." *Oxford Bulletin of Economics and Statistics*, *82*(4), 864–888.

Sutherland, H., and Figari, F. (2013). "EUROMOD: the European Union Tax-benefit Microsimulation Model." *International Journal of Microsimulation*, *6*(1), 4–26.

Waiswa, R., Okello Ayo, J., Noble, M., Kavuma, S., and Wright, G. (2022). "SOUTHMOD country report Uganda - UGAMOD v1.8." *UNU-WIDER: Helsinki*.

World Bank (2022). "Poverty and Shared Prosperity 2022: Correcting Course." *Washington, DC: World Bank*.

Wright, G., and Mpike, M. (2021). "A South African Tax and Benefit Microsimulation Model." *Social Security Review 2021: Evolution of Social Security in South Africa – An Agenda for Action*, 92–97.

6 Tables

Table 1: Overview of main social protection programmes and design features

Programme	Type	Target Group	Eligibility Criteria	Shock-Responsive
Ghana				
LEAP Transfer	Cash benefit	Poor/vulnerable households	Proxy means-test	No
School Feeding Programme	In-kind benefit	Children in public schools	Universal	No
Free Senior High School policy	In-kind benefit	Secondary students	Universal	No
Old-age Pension	Contributory pension	Retirees	Contribution history	No
Mozambique				
Basic Social Subsidy	Cash benefit	Vulnerable individuals/households	Income-test	Yes
Old-age/Survivors' Pension	Contributory pension	Retirees, survivors	Contribution history	No
Rwanda				
Vision 2020 Umurenge Programme (VUP) Direct Support	Cash benefit	Labour-constrained poor households	Proxy means-test	No
VUP Public Works	In-kind benefit	Poor adults	Proxy means-test	No
Girinka (One Cow per Poor Family)	In-kind benefit	Poor rural households	Proxy means-test	No
Rwanda Demobilisation and Reintegration Programme	Cash benefit	Ex-combatants	Proxy means-test	No
Genocide Survivors Support and Assistance Fund (FARG)	Cash benefit	Survivors	Proxy means-test	No
Rwanda Social Security Board (RSSB) Pension	Contributory pension	Retirees, disabled individuals, survivors	Contribution history	No
South Africa				
Unemployment Insurance	Cash benefit	Former formal workers	Contribution history + employment loss	Yes
Child Support Grant	Cash benefit	Low-income households with children	Income-test	Yes
Old Age Grant	Cash benefit	Elderly	Income-test	Yes
Disability Grant	Cash benefit	Disabled individuals	Income-test	Yes
Care Dependency Grant	Cash benefit	Low-income households with disabled children	Income-test	Yes
Grant in Aid	Cash benefit	Disabled or elderly in need of care	Income-test	Yes
Foster Child Grant	Cash benefit	Foster children	Universal	No
Tanzania				
Productive Social Safety Net	Cash benefit	Extremely poor households	Proxy means-test + community verification	No
Uganda				
Senior Citizens' Grant	Cash benefit	Elderly (65+)	Universal	No
Zambia				
Social Cash Transfer	Cash benefit	Vulnerable households	Proxy means-test	No
Supporting Women's Livelihoods	One-off benefit	Poor women with children	Proxy means-test	No
Keeping Girls in School	In-kind benefit	School-age girls in Social Cash Transfer households	Proxy means-test	No
Food Security Pack	In-kind benefit	Vulnerable smallholder farmers	Proxy means-test	No
Home Grown School Meal Programme	In-kind benefit	Public School students	Universal	No
Electronic-Farmer Input Support Programme	In-kind benefit	Farmers	Universal	
Old-age/Invalidity Pension	Contributory pension	Retirees, disabled individuals	Contribution history	No

Source: Own representation based on the SOUTHMOD Country Reports (Adu-Ababio et al. 2022; Castelo et al. 2022; de Mahieu et al. 2024; Kalikeka et al. 2022; Leyaro et al. 2022; Waiswa et al. 2022; Wright and Mpike 2021).

Table 2: Share of population groups (in %)

	Ghana	Mozambique	Rwanda	South Africa	Tanzania	Uganda	Zambia
Vulnerability:							
Extremely poor	25.1	54.2	54.9	14.4	44.5	71.0	58.7
LMI poor	23.9	25.8	23.6	15.4	30.1	17.6	17.8
UMI poor	29.8	13.6	13.4	21.8	18.0	8.5	14.1
Vulnerable	10.9	2.9	3.9	37.3	3.9	1.7	4.0
Non-vulnerable	10.3	3.5	4.3	11.2	3.5	1.3	5.4
Being an earner:							
All	21.9	14.1	40.8	32.8	23.7	24.3	19.7
By vulnerability group:							
Extremely poor	12.7	9.1	38.6	7.6	17.2	20.4	15.0
LMI poor	18.3	15.7	40.3	14.4	23.8	29.8	22.7
UMI poor	22.4	22.9	43.4	23.1	31.8	37.6	25.9
Vulnerable	30.6	28.0	49.1	45.2	43.9	45.1	30.9
Non-vulnerable	42.3	34.9	56.0	68.1	42.4	45.6	35.9
Age:							
0-17	45.0	54.9	47.8	34.0	49.8	55.0	50.8
18-29	19.8	17.7	20.2	21.8	17.4	19.5	21.8
30-39	12.6	10.5	13.5	16.5	11.4	10.6	11.8
40-49	9.0	7.3	7.6	11.1	9.2	6.7	7.2
50-59	6.4	4.9	5.4	7.9	5.6	3.8	4.2
60+	7.2	4.8	5.4	8.7	6.6	4.3	4.2
Women:							
All	51.5	51.9	52.0	51.2	52.0	51.6	51.4
Earner	28.2	20.0	68.6	45.7	38.4	45.7	32.7
Formal	20.9	25.9	10.2	89.7	14.4	8.2	16.2
Informal	72.5	74.1	76.0	6.5	85.6	22.8	69.2
Female-headed hhs	33.4	29.1	25.0	48.5	28.2	30.5	23.2
Men:							
All	48.5	48.1	48.0	48.6	48.0	48.4	48.6
Earner	68.2	50.2	92.8	64.3	67.5	83.5	68.0
Formal	20.5	42.0	16.7	89.5	17.2	10.3	17.6
Informal	71.5	58.0	71.4	9.4	82.8	27.4	69.8
Male-headed hhs	66.6	70.9	75.0	51.5	71.8	69.5	76.8
Under-18-year-olds in the hh:							
None	14.0	5.9	8.6	26.7	8.0	6.9	6.2
1–2	34.1	25.7	37.6	40.5	31.8	25.0	28.9
3+	51.9	68.4	53.8	32.9	60.1	68.1	64.8
(Unweighted) N individuals	59,864	109,107	64,314	39,434	45,926	74,422	62,879
(Unweighted) N hhs	14,009	21,879	14,580	10,659	9,465	15,721	12,251

Notes: The table shows the share of individuals with different characteristics: by vulnerability, age group and gender (women vs men) as a proportion of the total population. It also includes women/men with earnings from (self-)employment and agricultural income as a proportion of the population aged 25+; women/men informal/formal earners as a proportion of all women/men earners aged 25+; female-/male-headed households and households with children under 18 as a proportion of all households. The shares of women/men informal and formal earners do not add up to 100% due to 'don't knows' and missing values. Vulnerability groups are defined based on baseline household per capita consumption, or income in South Africa, as follows: below the international poverty line of international-$2.5 per day (in 2017 prices) as *extremely poor*; between the international and lower-middle-income poverty line of $3.65 per day as *LMI poor*; between the lower-middle-income and upper-middle-income poverty line of $6.85 per day as *UMI poor*; between 1 and 1.4 times the upper-middle-income poverty line as *vulnerable*; and above 1.4 times the upper-middle-income poverty line as *non-vulnerable*. *Source:* Own calculations.

Table 3: Benefit coverage in the baseline (%) and change (% points) due to a shock

	Ghana		Mozambique		Rwanda		South Africa		Tanzania		Uganda		Zambia	
	B	Δ	B	Δ	B	Δ	B	Δ	B	Δ	B	Δ	B	Δ
All	52.9	.0	8.7	1.5	2.9	.0	60.3	25.7	7.8	.0	4.1	.0	49.5	.0
Vulnerability group:														
Extremely poor	75.5	.0	9.7	.5	2.4	.0	77.3	3.9	18.9	.0	4.9	.0	70.4	.0
LMI poor	63.2	.0	9.1	1.8	3.8	.0	93.8	1.4	.0	.0	2.2	.0	42.6	.0
UMI poor	47.7	.0	8.0	3.5	3.1	.0	92.0	2.8	.0	.0	2.0	.0	22.7	.0
Vulnerable	39.0	.0	2.5	1.3	4.5	.0	51.4	33.8	.0	.0	.8	.0	19.7	.0
Non-vulnerable	24.7	.0	5.9	1.1	4.0	.0	8.1	60.7	.0	.0	5.6	.0	10.5	.0
Age group:														
0-17	62.5	.0	9.1	1.4	2.6	.0	73.3	21.1	9.3	.0	3.6	.0	53.2	.0
18-29	46.2	.0	8.1	1.7	2.4	.0	57.3	26.1	6.1	.0	2.8	.0	43.4	.0
30-39	39.3	.0	7.1	1.4	1.7	.0	44.0	37.5	6.3	.0	1.4	.0	39.7	.0
40-49	52.7	.0	6.6	1.5	2.5	.0	44.7	31.7	7.9	.0	2.2	.0	43.5	.0
50-59	46.5	.0	10.7	1.3	2.3	.0	52.0	23.9	6.4	.0	3.5	.0	54.7	.0
60+	44.5	.0	13.2	.7	13.6	.0	93.6	4.0	5.1	.0	25.6	.0	77.0	.0
Women:														
All	53.6	.0	8.7	1.5	3.0	.0	65.3	22.7	7.9	.0	4.3	.0	49.5	.0
Formal earner	26.2	.0	8.5	2.2	1.9	.0	48.7	31.4	2.2	.0	.7	.0	23.7	.0
Informal earner	38.0	.0	7.7	2.2	3.2	.0	77.8	8.8	6.2	.0	2.0	.0	47.5	.0
Female-headed hhs	47.9	.0	8.9	1.2	5.5	.0	74.1	16.3	9.7	.0	5.9	.0	63.9	.0
Men:														
All	52.2	.0	8.8	1.4	2.9	.0	55.3	28.8	7.7	.0	3.9	.0	49.4	.0
Formal earner	33.2	.0	6.6	2.4	3.8	.0	36.1	41.8	1.5	.0	1.0	.0	16.9	.0
Informal earner	38.6	.0	8.1	.7	2.2	.0	44.8	6.2	6.3	.0	2.9	.0	49.6	.0
Male-headed hhs	54.3	.0	8.7	1.5	2.4	.0	43.9	36.9	7.3	.0	3.6	.0	46.4	.0
Under-18-year-olds:														
None	11.5	.0	1.9	.0	6.6	.0	19.1	41.6	1.0	.0	5.0	.0	34.0	.0
1–2	38.7	.0	7.5	1.7	2.8	.0	65.0	26.5	2.9	.0	4.7	.0	39.5	.0
3+	73.4	.0	9.6	1.5	2.6	.0	85.1	12.9	11.1	.0	3.8	.0	55.3	.0

Notes: Benefit coverage is the number of individuals living in households in receipt of social protection benefits, as a proportion of different population groups. B = baseline (%). Δ = change (% points) relative to baseline due to the employment shock. Population groups are defined based on baseline characteristics. For definition of vulnerability groups, see notes of Table 2. Results based on a simulated employment shock reducing aggregate household earnings by 30%. The sample includes households with individuals affected by the shock. *Source:* Own calculations.

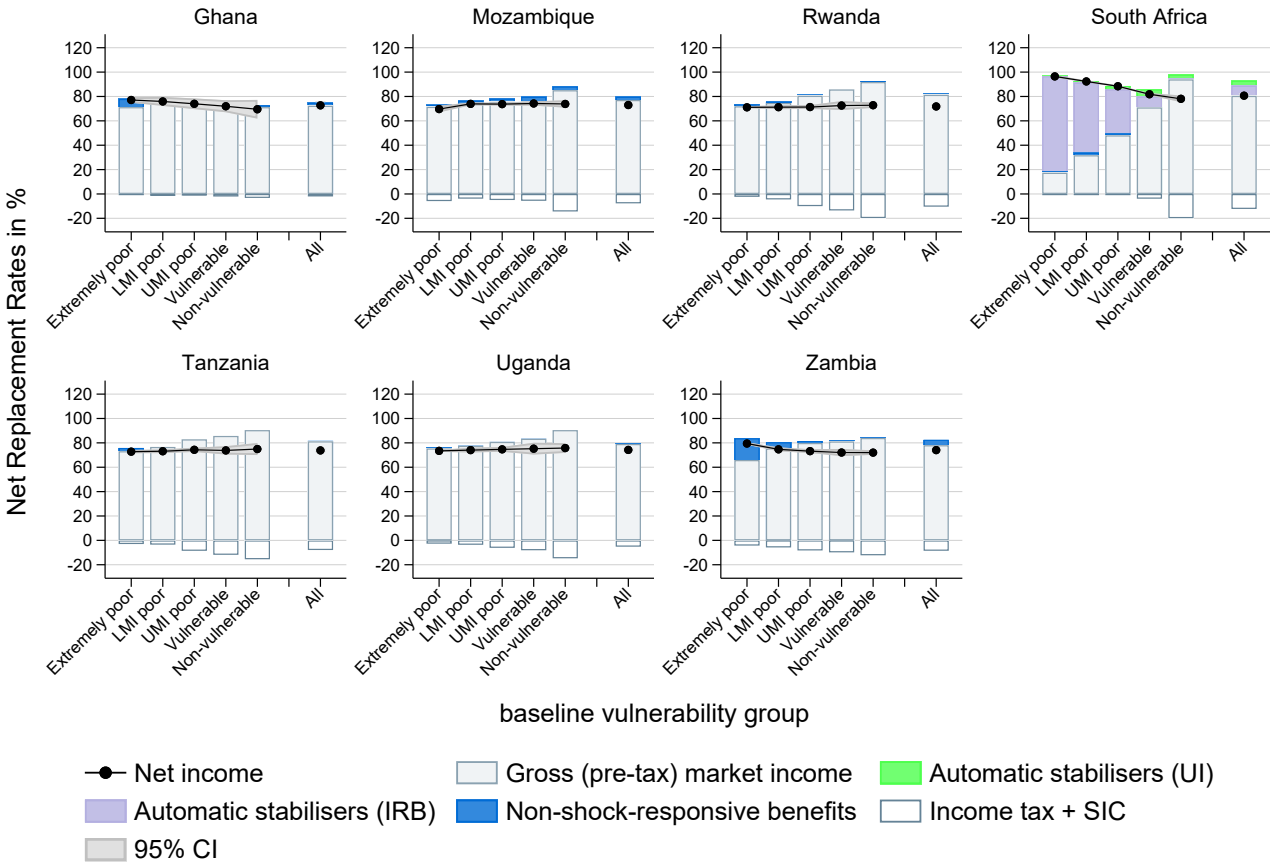
Table 4: Average benefit amount, relative to the poverty line, in the baseline and change due to a shock

	Ghana		Mozambique		Rwanda		South Africa		Tanzania		Uganda		Zambia	
	B	Δ	B	Δ	B	Δ	B	Δ	B	Δ	B	Δ	B	Δ
All	8.1	.0	2.4	.1	.9	.0	45.3	112.0	.5	.0	.3	.0	4.6	.0
Vulnerability group:														
Extremely poor	5.8	.0	1.5	.0	.4	.0	37.9	2.2	1.2	.0	.3	.0	6.1	.0
LMI poor	6.7	.0	1.6	.2	.7	.0	69.8	6.1	.0	.0	.2	.0	4.5	.0
UMI poor	7.5	.0	2.4	.3	.8	.0	68.0	23.3	.0	.0	.1	.0	2.5	.0
Vulnerable	10.3	.0	6.8	.1	1.6	.0	40.4	116.4	.0	.0	.1	.0	2.1	.0
Non-vulnerable	14.2	.0	10.1	.1	8.2	.0	7.3	353.1	.0	.0	.2	.0	1.6	.0
Age group:														
0-17	7.3	.0	2.0	.1	.4	.0	51.0	72.4	.6	.0	.2	.0	4.4	.0
18-29	8.5	.0	2.4	.1	1.2	.0	38.1	129.4	.4	.0	.1	.0	4.2	.0
30-39	5.3	.0	1.8	.1	.9	.0	31.6	152.5	.4	.0	.1	.0	3.6	.0
40-49	7.3	.0	1.5	.1	.4	.0	31.1	141.4	.5	.0	.1	.0	3.9	.0
50-59	9.9	.0	4.2	.1	1.1	.0	38.4	109.1	.4	.0	.2	.0	6.0	.0
60+	18.9	.0	9.6	.1	5.1	.0	122.8	82.9	.3	.0	2.8	.0	13.2	.0
Women:														
All	8.3	.0	2.5	.1	.8	.0	48.5	88.8	.5	.0	.3	.0	4.7	.0
Formal earner	11.4	.0	9.3	.2	2.6	.0	33.0	123.4	.2	.0	.0	.0	3.6	.0
Informal earner	5.6	.0	1.9	.2	.7	.0	60.7	33.0	.4	.0	.1	.0	5.8	.0
Female-headed hhs	7.9	.0	3.9	.1	1.4	.0	54.1	69.7	.6	.0	.4	.0	7.1	.0
Men:														
All	7.9	.0	2.3	.1	1.1	.0	42.1	135.2	.5	.0	.3	.0	4.4	.0
Formal earner	10.3	.0	2.7	.2	4.9	.0	27.1	219.4	.1	.0	.1	.0	1.3	.0
Informal earner	5.5	.0	1.7	.1	.5	.0	40.7	17.4	.4	.0	.2	.0	5.3	.0
Male-headed hhs	8.2	.0	2.0	.1	.8	.0	34.7	162.4	.4	.0	.3	.0	4.1	.0
Under-18-year-olds:														
None	10.9	.0	4.3	.0	6.7	.0	27.5	223.2	.0	.0	1.0	.0	8.1	.0
1–2	7.4	.0	2.7	.2	.6	.0	44.1	98.9	.2	.0	.4	.0	5.1	.0
3+	7.9	.0	2.2	.1	.3	.0	59.9	45.6	.7	.0	.2	.0	4.0	.0

Notes: The average benefit amount per person is calculated as the product of the share of individuals receiving the benefit (coverage) and the average benefit received among recipients. Amounts are presented relative to the international poverty line of international-$2.15 (in 2017 prices). B = baseline (%). Δ = absolute change relative to baseline due to the employment shock. Population groups are defined based on baseline characteristics. For definition of vulnerability groups, see notes of Table 2. Results based on a simulated employment shock reducing aggregate household earnings by 30%. The sample includes households with individuals affected by the shock. *Source:* Own calculations.

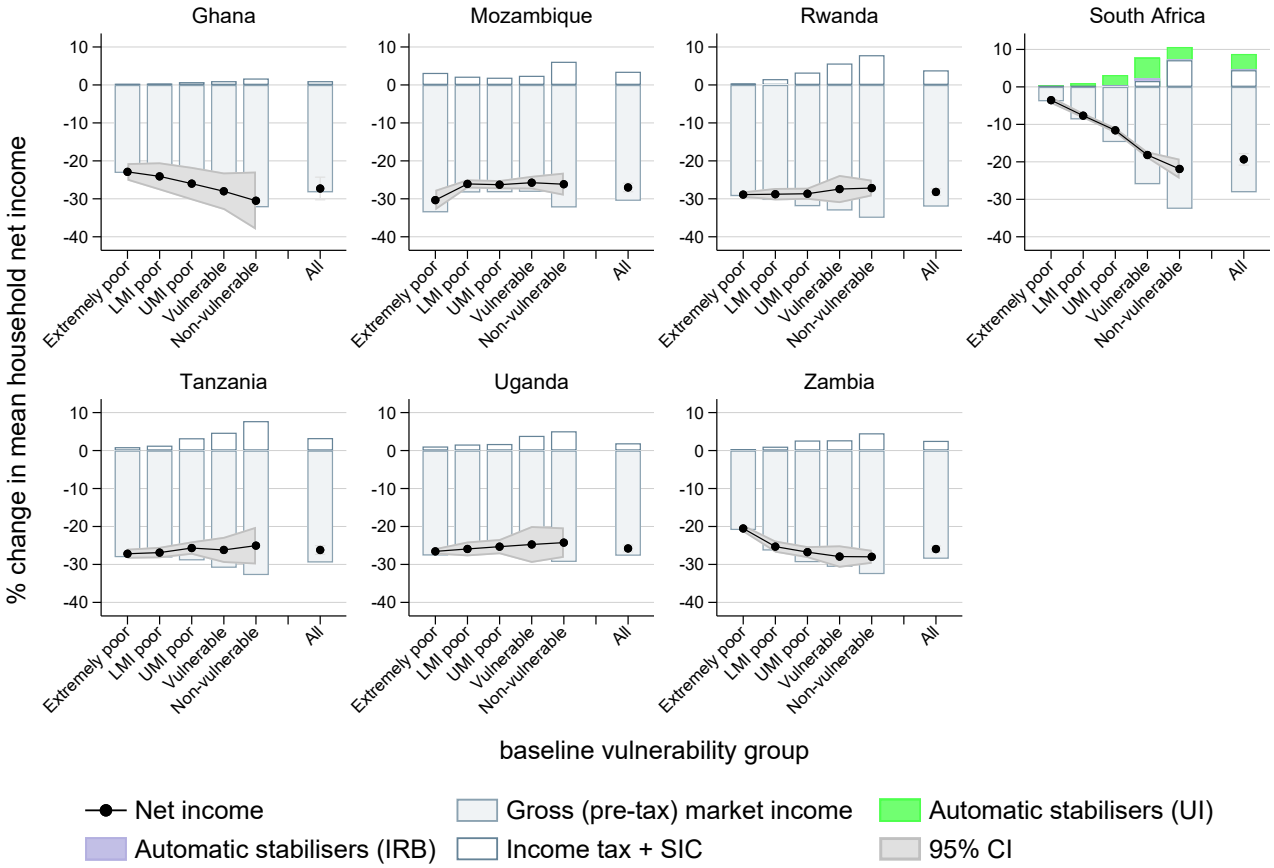
7 Figures

Figure 1: Net Replacement Rates by vulnerability group



Notes: The figure shows Net Replacement Rates, i.e. the ratio between the average household net income after the shock and in the baseline, broken down by income source. The bars "Automatic stabilisers (UI)" and "Automatic stabilisers (IRB)" show the contribution of unemployment insurance and income-related means-tested benefits, respectively, acting as automatic stabilisers. For definition of vulnerability groups, see notes of Table 2. Results based on household net income per capita and a simulated employment shock reducing aggregate household earnings by 30%. *Source:* Own calculations.

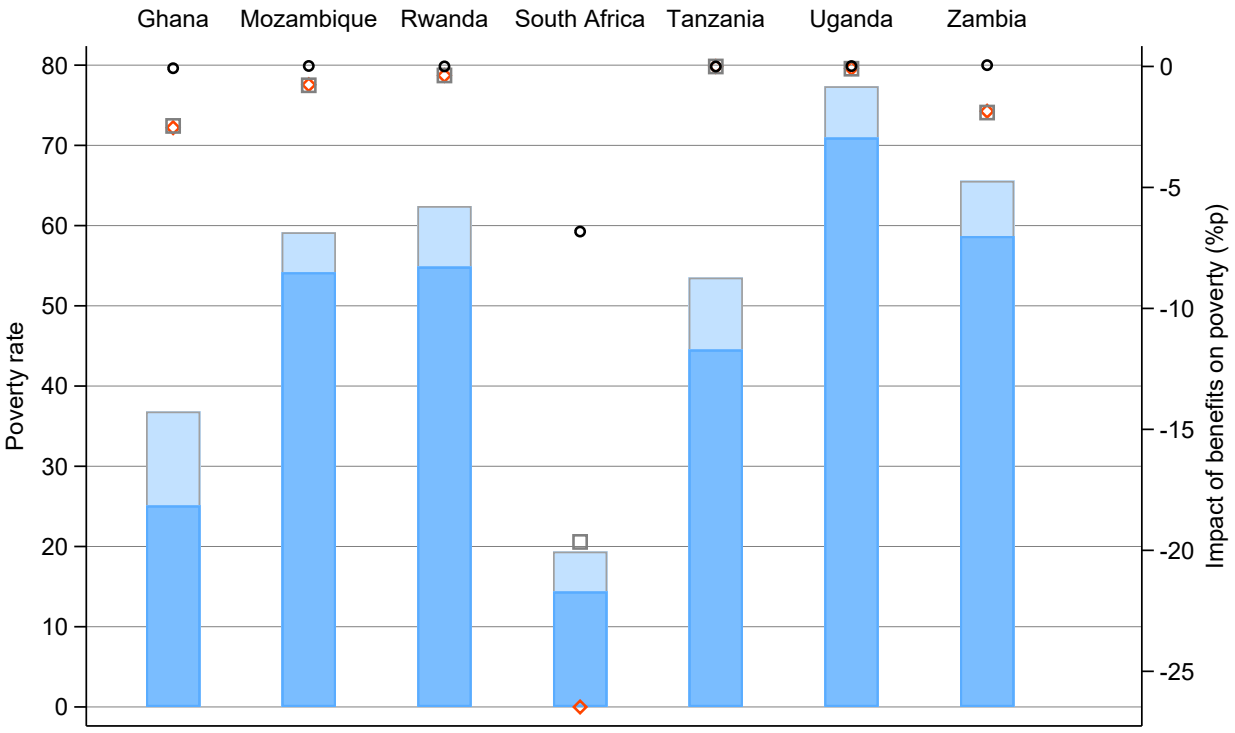
Figure 2: Impact of an employment shock on mean net income by vulnerability group



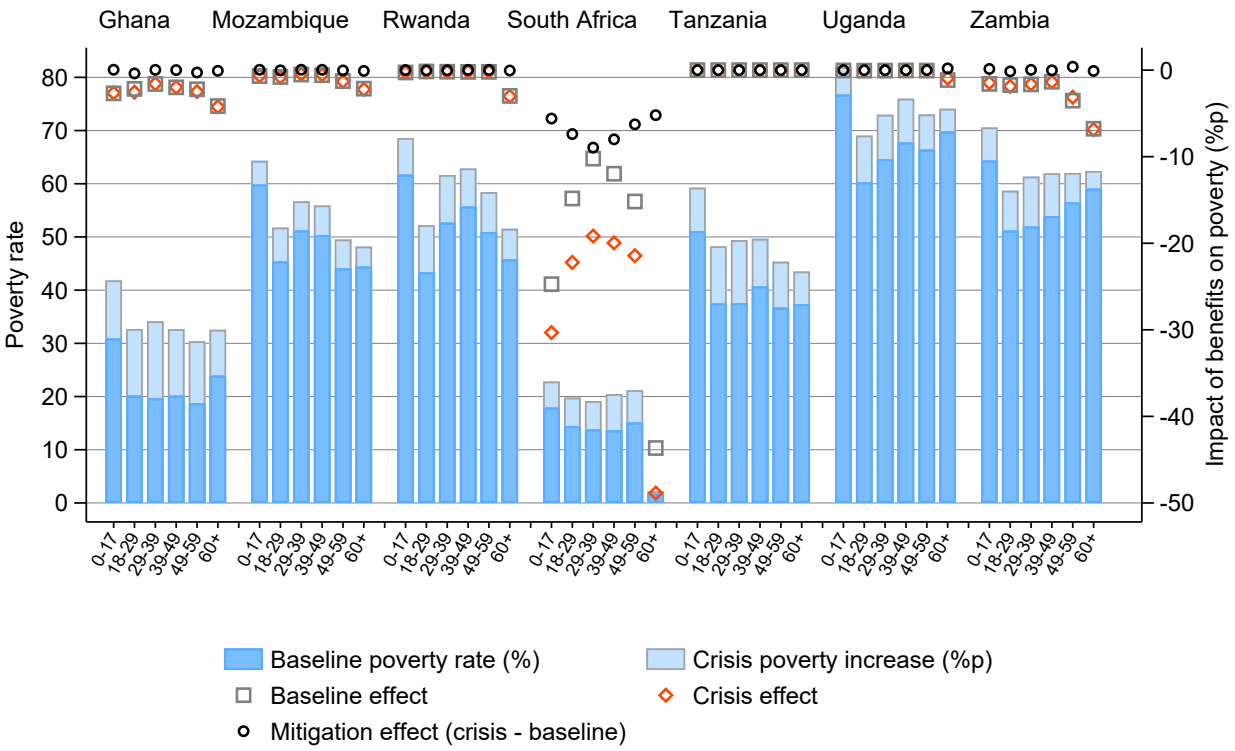
Notes: The figure shows the distributional impact of the shock. The bars "Automatic stabilisers (UI)" and "Automatic stabilisers (IRB)" show the contribution of unemployment insurance and income-related means-tested benefits, respectively, acting as automatic stabilisers. For definition of vulnerability groups, see notes of Table 2. Results based on household net income per capita and a simulated employment shock reducing aggregate household earnings by 30%. *Source:* Own calculations.

Figure 3: Poverty rates

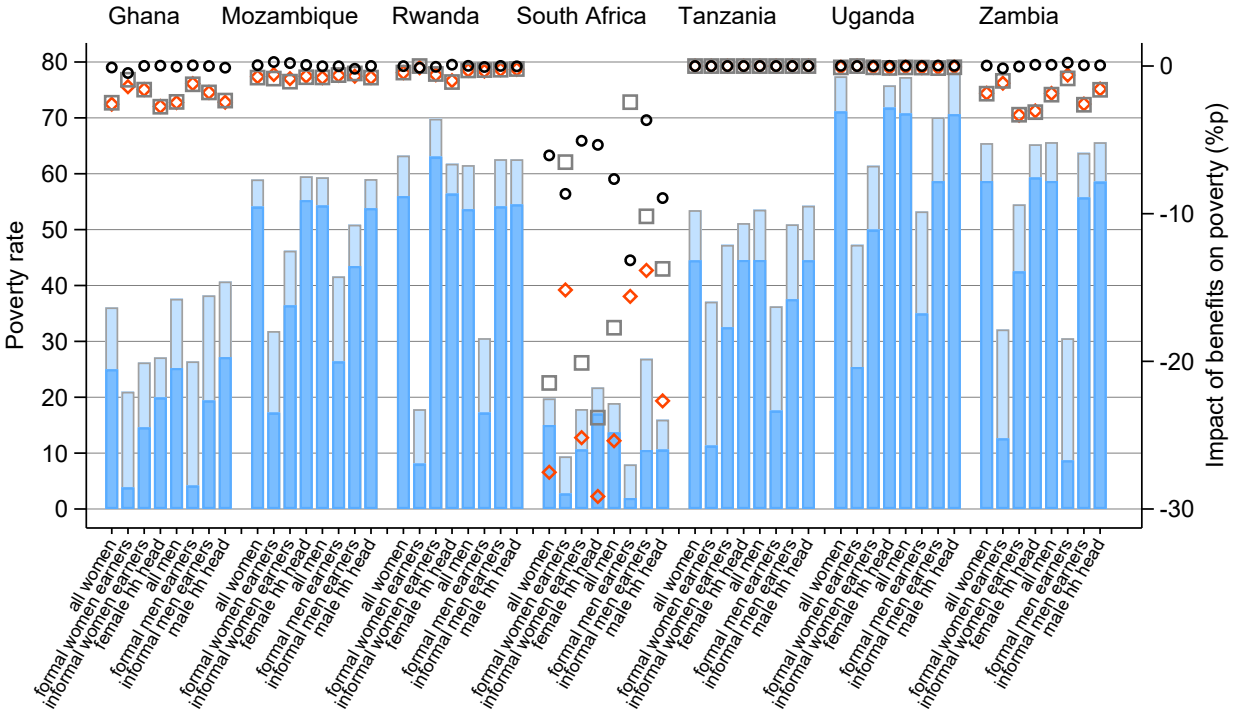
a) all



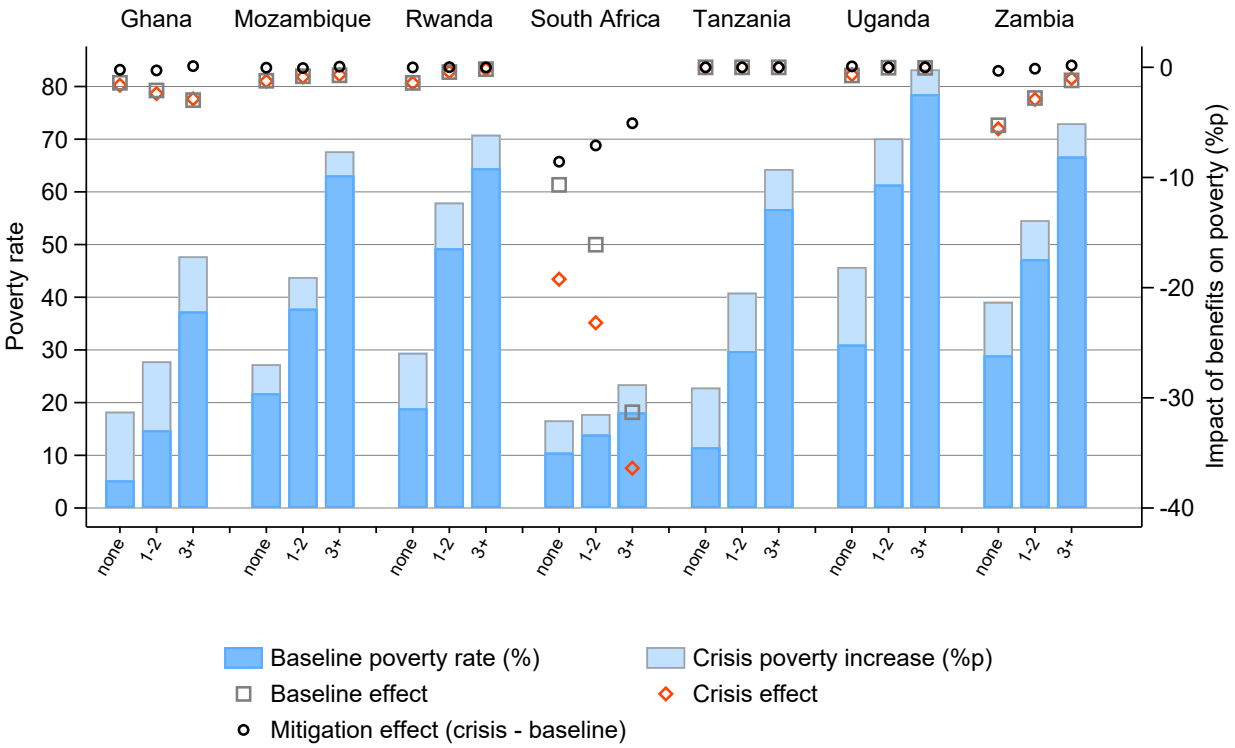
b) age



c) gender and formality



d) children in the household



Notes: The left vertical axis shows the consumption (in South Africa the income) poverty rate in the baseline (%) measured against the international poverty line of $2.15 per day (in 2017 prices); and the increase due to crisis (% points), i.e. an employment shock reducing aggregate household earnings by 30%. The right vertical axis shows the impact of benefits, both non-shock-responsive benefits and automatic stabilisers, on the poverty rate (% points): baseline effect, crisis effect, and mitigation effect (the difference between crisis and baseline effects). Population groups are defined based on baseline characteristics. *Source:* Own calculations.

Supplementary Materials

A Tables

Table A.1: Country characteristics

Country	**Population** (millions)	**Median age**	**Life expectancy**	**Income class**	**GDP per capita**	**SP Expenditure** (% GDP)	**Informal employment**
Ghana	32.2	20.2	64.1	LMIC	6,002.55	1.7	78.1
Mozambique	31.2	16.7	61.2	LIC	1,388.80	0.8	95.7
Rwanda	13.1	18.8	66.8	LIC	2,336.04	1.8	83.2
South Africa	58.8	26.9	65.3	UMIC	13,361.49	5.5	40.5
Tanzania	61.7	16.7	66.4	LMIC	2,981.87	1.7	93.3
Uganda	44.4	15.7	62.9	LIC	2,441.37	0.7	93.1
Zambia	18.9	16.8	62.4	LIC	3,361.40	0.8	84.5

Sources: Population and median age in 2020: UN World Population Prospects 2022 (https://population.un.org/wpp/Download/Standard/MostUsed/). Life expectancy at birth in 2020: World Bank Data indicator SP.DYN.LE00.IN. Income classification: World Bank Country and Lending Groups (https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups). GDP per capita, PPP (current international $) in 2019: World Bank Data indicator NY.GDP.PCAP.PP.CD. Social protection expenditure (excluding health) in 2020 or nearest available year: Table A4.3 in ILO, 2021. Informal employment in 2019 or nearest available year: ILO SDG indicator 8.3.1 Proportion of informal employment in total employment.

Table A.2: Detailed overview of main social protection programmes, income tax and SIC

Name	Type	Target group	Benefit eligibility criteria/Income tax and SIC schedule
Ghana			
LEAP transfer programme	Cash benefit	Extremely poor households with orphans or vulnerable children; an elderly person; a pregnant woman or a severely disabled person	Proxy means-test
School Feeding Programme	In-kind benefit	Children attending a public primary school	Universal
Free Senior High School policy	In-kind benefit	Students in a public senior high school	Universal
Old-age Pension	Contributory pension	Retirees	Contribution history
Personal income tax	Direct tax	Individuals with an annual income from main employment and work or enterprise above 3,456 are liable	Marginal tax rates (MTRs) for incomes above 3,456 start at 5% and go up to 30%
Presumptive tax	Direct tax	Individuals with an annual turnover between 10,000 and 120,000 are liable	Flat rate of 3%
Capital income tax	Direct tax	Individuals with capital income	Flat rate of 10%
Employee SIC for pension and health	SIC	Employees and entrepreneurs in the formal sector	Flat rate of 3% for employees and 2.5% for entrepreneurs
Mozambique			
Basic Social Subsidy (Programa do Subsídio Social Básico)	Cash benefit	Individuals with incomes below a certain threshold, living in a household with incomes below a certain threshold and one of the following household members: elderly with permanent incapacity for work, disabled people unable to work, people with a chronic and degenerative disease, permanently bedridden, malnourished children aged 0–2 inclusive, orphans aged 14–18 inclusive heading the household, orphaned children living in poverty	Income-test
Old-age pension (Pensão de reforma)	Contributory pension	Retirees	Contribution history
Survivors' pension (Pensão de sangue (viuvez))	Contributory pension	Survivors and widows	Contribution history
Personal income tax	Direct tax	Individuals with employment income above 20,249 per month are liable	MTRs for incomes above 20,249 start at 10% and go up to 32%
Presumptive tax	Direct tax	Self-employment agents earning an amount equal to or less than 2.5 million per year are liable	Flat rate of 3%
Other personal income tax	Direct tax	Individuals with other personal income above 225,000 per year are liable	MTRs start at 10% and go up to 32%
Employee SIC	SIC	Individuals in formal employment, the public sector and self-employed registered with the fund	Flat rate of 3% for employees, 7% for those in the public sector and 7% for self-employed
Rwanda			
Vision 2020 Umurenge Programme (VUP) Direct Support	Cash benefit	Labour-constrained households	Proxy means-test

Name	Type	Target group	Benefit eligibility criteria/Income tax and SIC schedule
Vision 2020 Umurenge Programme (VUP) Public Works	In-kind benefit	Very poor households with adults who are able to work	Proxy means-test
Girinka (One Cow per Poor Family)	In-kind benefit	Poor households who do not own a cow but have a shed and some land	Proxy means-test
Rwanda Demobilisation and Reintegration Programme (RDRP)	Cash benefit	Vulnerable individuals who used to serve in the Rwanda Defence Forces or other armed groups	Proxy means-test
Genocide Survivors Support and Assistance Fund (FARG)	Cash benefit	Genocide survivors with specific targeting of orphans, elderly and adults with disabilities	Proxy means-test
Rwanda Social Security Board (RSSB) Pension (Caisse Sociale du Rwanda)	Contributory pension	Individuals aged 60 and older, workers who become disabled and survivors of workers	Contribution history
Personal income tax	Direct tax	Individuals with incomes from employment, self-employment (if not liable to presumptive tax), investment income and profits above 3,000 are liable	Rates for incomes above 3,000 start at 20% and go up to 30%
Rental income tax	Direct tax	Individuals with rental income (only 50% of the income is liable to tax)	MTRs start at 20% and go up to 30%
Presumptive/turnover tax	Direct tax	Individuals with turnover from self-employment below the threshold of 20,000,000 per year are liable	Lump-sums for micro-enterprises and 3% for small businesses
Employee Pension Contribution	SIC	Employees, self-employed can decide to contribute	Flat rate of 3% (6% for self-employed)
Employee Maternity Leave Contribution	SIC	Employees	Flat rate of 3%
Employee/Pensioner Health Insurance Contribution	SIC	Employees, pensioners, military workers and informal workers	Flat rate of 7.5% for employees and pensioners and 5% for military workers; lump-sum for informal workers
South Africa			
Unemployment Insurancet	Cash benefit	Employees who become unemployed and have paid into the Unemployment Insurance Fund for four years or more can claim the benefit	Contribution history + employment loss
Child Support Grant	Cash benefit	Child benefit for children whose parents pass the income test	Income-test
Old Age Grant	Cash benefit	Benefit for elderly aged 60 and older who pass the income test	Income-test
Disability Grant	Cash benefit	Grant for adults with disability who pass the income test	Income test
Care Dependency Grant	Cash benefit	Grant for children with severe mental or physical disabilities whose parents pass the income test	Income-test
Grant in Aid	Cash benefit	Recipients of the Disability Grant or the Old Age Grant who need full-time care	Income-test
Foster Child Grant	Cash benefit	Grant for foster children younger than 18	Universal
Personal income tax	Direct tax	MTRs start at 18% go up to 45% after taking personal rebates into account	

Name	Type	Target group	Benefit eligibility criteria/Income tax and SIC schedule
Unemployment Insurance Fund Contributions	SIC	Formal employees	Flat rate of 1% with an upper limit
Tanzania			
Productive Social Safety Net	Cash benefit	Households with very low and unpredictable income compared with other households in the community; households that cannot afford or cannot be certain that they can afford to have three meals per day, households located in extremely poor environments/settlements. A top-payment payment is targeted at the same households that additionally: have school-age children (7–17 years inclusive) that cannot afford to register or enrol the children in school or where the children have dropped out of school because the household cannot afford to send them to school; have children (0–6 years inclusive) that do not attend the clinic to get health services/treatment; have one or more pregnant women in residence	Proxy means-test + community verification
Personal income tax	Direct tax	Individuals with incomes from employment, property, land, agriculture and other incomes and for self-employed with turnover above 10 million per year if the income is above 2.040 million per year	MTRs for incomes above 2.04 million start at 9% and go up to 30%
Presumptive tax	Direct tax	Individuals with turnover from self-employment above 4 million per year and below 10 million per year	MTRs for incomes above 4 million start at 3% and go up to 3.5%
Employee SIC for pension and health	SIC	The health contribution is mandatory for civil servants, individuals with gross employment income from other occupations can join voluntarily. Pension fund contributions are paid by formal workers in the private and public sector and some self-employed people.	Flat rate of 3% for health and 5% for pension
Uganda			
Senior Citizens' Grant	Cash benefit	The eligibility criteria have changed over time for this benefit. It was initially targeted at older persons of 65 years and above in selected districts. The age threshold was then lowered to 60 years in the case of people living in the more vulnerable Karamoja region. The benefit was extended to an increasing number of districts for those aged 65 and above	Universal
Personal income tax	Direct tax	Individuals with income from employment, agriculture and 'other income' above 820,000 per year are liable. This also includes self-employment income for those whose turnover is less than 10 million per year but who also have other types of taxable income; and the self-employment income of those with turnover greater than 150 million per year.	MTRs for incomes above 820,000 start at 10% and go up to 40%
Presumptive tax	Direct tax	Individuals with turnover between 50 million per year and below 150 million per year are liable.	Flat amount varying by bracket or flat rate of 1.5%, whichever is lower
Local service tax	Direct tax	Individuals with earnings from formal employment or self-employed professionals and artisans or who pay turnover tax or who are commercial farmers	Annual tax payment varies by group and taxable income

Name	Type	Target group	Benefit eligibility criteria/Income tax and SIC schedule
Rental income tax	Direct tax	Individuals with income from property and land above the threshold of 2,820,000 per year, so long as 80% of the overall revenue also exceeds the threshold of 2,820,000 per year.	Flat rate of 20%
Employee SIC	SIC	All employees are liable (usually only those in the formal sector contribute)	Flat rate of 5%
Zambia			
Social Cash Transfer	Cash benefit	Vulnerable households such as child-headed; elderly household member; disabled household member; chronically ill household member; or female-headed households	Proxy means-test
Supporting Women's Livelihood	One-off cash benefit	Women living in Social Cash Transfer households aged 19-64; fit to work; with at least one child and living in a poor household (do not get enough to eat, frequently beg from their neighbours, survive through piecework, own very little, etc.)	Proxy means-test
Keeping Girls in School	In-kind benefit	Girls of secondary school-age living in Social Cash Transfer households	Proxy means-test
Food Security Pack	In-kind benefit	Vulnerable and smallholder farmers, with a viable household member not in any gainful employment; who cultivate between 0.5 to 2 hectare land; living in a food insecure household or reduced access to farming inputs. Vulnerable is defined as child-headed household; aged-headed household; disable-headed household; chronically ill headed household; female-headed household;unemployed-youth headed household; or an institution looking after orphans	Proxy means-test
Home Grown School Meal Programme	In-kind benefit	Students attending a public school in an eligible district	Universal
Electronic-Farmer Input Support Programme	In-kind benefit	Small-scale farmers (graduating from FSP) who are a member of a registered farmer organisation; have the capacity to pay the farmer contribution and who are cultivating land between 0.5 to 5 hectare	Universal
Old-age/Invalidity pension	Contributory pension	Retirees, disabled individuals	Contribution history
Personal income tax	Direct tax	Individuals with incomes from employment, self-employment (if not liable to presumptive tax), property and capital with incomes above 36,000 per year	MTRs for incomes above 36,000 start at 25% and go up to 35%
Presumptive tax	Direct tax	Individuals with turnover from self-employment below the threshold of 800,000 per year are liable	Flat rate of 4%
Employee SIC for pension	SIC	All formal private and public sector employees are required to contribute	Flat rate of 5% and a contribution ceiling of 1,073.8 per month

Source: Own representation based on SOUTHMOD Country Reports (Adu-Ababio et al. 2022; Castelo et al. 2022; Kalikeka et al. 2022; Leyaro et al. 2022; Waiswa et al. 2022; Wright and Mpike 2021).

Table A.3: Share (in %) of earners and total household earnings in each shock scenario, relative to the baseline, by country and size of shock

	Ghana			Mozambique			Rwanda			South Africa			Tanzania			Uganda			Zambia		
	10%	30%	50%	10%	30%	50%	10%	30%	50%	10%	30%	50%	10%	30%	50%	10%	30%	50%	10%	30%	50%
Number of earners:																					
All	87.6	67.1	47.5	89.4	69.1	50.6	89.8	70.1	50.9	90.4	70.1	50.9	89.8	71.1	51.1	89.2	69.8	50.8	89.8	70.5	51.3
Women	88.0	71.2	48.7	89.9	70.0	52.4	90.1	71.2	51.1	90.6	70.7	50.7	89.6	72.4	50.8	88.6	71.8	50.9	89.3	70.7	52.7
Men	87.4	64.9	46.9	89.2	68.7	49.8	89.6	69.1	50.8	90.1	69.6	50.9	89.9	70.2	51.3	89.5	68.5	50.8	90.0	70.4	50.6
By vulnerability group:																					
Extremely poor	90.9	71.9	48.9	87.7	66.1	49.3	89.3	68.8	50.5	88.9	69.3	52.7	89.4	69.7	48.4	89.3	69.7	49.8	89.7	71.3	52.3
LMI poor	84.8	71.0	59.1	90.6	70.7	50.7	91.1	71.6	50.5	88.5	68.1	48.1	89.3	71.5	52.7	89.2	70.9	53.4	90.2	71.5	53.1
UMI poor	87.9	64.1	43.0	90.1	70.8	52.5	89.5	69.6	51.5	90.7	70.7	51.2	90.6	72.1	51.8	88.2	68.4	51.0	90.5	68.8	49.0
Vulnerable	87.3	70.2	48.2	88.4	68.5	49.6	89.9	75.9	54.7	89.9	69.7	50.9	89.5	69.6	49.8	91.0	67.4	55.3	88.6	69.8	50.3
Non-vulnerable	87.7	61.7	41.3	91.6	71.9	51.7	89.6	71.9	52.0	91.9	71.4	51.2	90.8	74.5	56.2	89.4	71.3	48.4	88.5	68.9	48.2
Total household earnings:																					
All	89.2	68.8	50.2	90.1	69.6	50.3	90.0	70.4	50.7	90.1	70.6	50.7	89.9	69.9	50.6	90.0	70.4	50.6	90.0	70.4	50.8
Women	86.2	69.9	50.7	90.2	70.3	50.8	89.8	70.3	50.7	90.0	70.5	50.0	89.6	70.3	50.7	90.0	70.3	50.5	90.0	70.4	50.7
Men	90.0	68.5	50.0	90.1	69.4	50.1	90.1	70.5	50.7	90.1	70.5	50.9	90.0	69.7	50.6	90.0	70.4	50.7	90.0	70.4	50.8
By vulnerability group:																					
Extremely poor	90.1	70.6	50.5	90.2	66.3	51.0	90.2	70.5	51.0	89.9	69.4	50.7	90.2	70.6	50.8	90.0	70.6	50.8	90.0	70.5	50.8
LMI poor	83.3	68.9	50.8	90.2	70.6	51.0	90.0	70.5	50.6	90.0	70.2	50.7	90.1	70.5	50.9	90.2	70.5	50.9	89.8	70.5	50.4
UMI poor	89.8	70.6	51.0	90.1	70.3	50.8	90.2	70.5	50.3	90.1	70.5	50.9	90.1	70.4	50.9	90.1	70.5	50.9	90.1	70.5	50.9
Vulnerable	90.0	68.5	46.8	89.8	69.9	50.8	89.9	70.5	50.9	90.1	70.4	50.9	89.9	70.2	50.2	89.9	69.9	50.3	90.1	70.5	50.8
Non-vulnerable	90.1	66.9	50.9	90.2	70.6	48.9	89.9	70.2	50.8	90.1	70.7	50.6	89.1	67.5	49.8	89.7	69.6	49.2	90.1	70.2	50.9

Notes: Vulnerability groups are defined based on baseline household per capita consumption, or income in South Africa, as follows: below the international poverty line of international-$2.5 per day (in 2017 prices) as *extremely poor*; between the international and lower-middle-income poverty line of $3.65 per day as *LMI poor*; between the lower-middle-income and upper-middle-income poverty line of $6.85 per day as *UMI poor*; between 1 and 1.4 times the upper-middle-income poverty line as *vulnerable*; and above 1.4 times the upper-middle-income poverty line as *non-vulnerable*. *Source:* Own calculations.

Table A.4: Benefit coverage in the baseline (%) and change (% points) due to a shock, in Mozambique and South Africa

	Mozambique				South Africa					
	B^{nrb}	Δ^{nrb}	B^{as-irb}	Δ^{as-irb}	B^{nrb}	Δ^{nrb}	B^{as-irb}	Δ^{as-irb}	B^{as-ui}	Δ^{as-ui}
All	3.1	.0	5.7	1.6	3.4	.0	59.7	12.9	.3	44.6
Vulnerability:										
Extremely poor	2.5	.0	7.3	.5	7.5	.0	77.3	.0	.0	12.6
LMI poor	2.9	.0	6.3	1.8	7.4	.0	93.8	.0	.0	14.5
UMI poor	4.7	.0	3.3	4.3	3.6	.0	91.9	1.9	.2	35.8
Vulnerable	2.0	.0	.5	1.3	3.0	.0	50.3	21.5	.5	54.0
Non-vulnerable	4.8	.0	1.1	1.1	.2	.0	7.8	15.8	.0	59.8
Age:										
0-17	2.9	.0	6.2	1.6	5.2	.0	72.5	18.2	.2	41.8
18-29	2.9	.0	5.3	1.9	3.4	.0	56.7	7.7	.5	48.4
30-39	2.3	.0	4.9	1.7	1.8	.0	43.9	14.5	.1	50.7
40-49	2.2	.0	4.4	1.7	1.1	.0	44.1	12.5	.3	45.8
50-59	4.8	.0	6.1	1.4	3.4	.0	51.0	11.5	.3	39.3
60+	9.3	.0	4.1	1.4	3.2	.0	93.6	3.1	.3	32.6
Women:										
All	3.1	.0	5.7	1.7	3.8	.0	64.8	13.9	.3	42.7
Formal earner	5.4	.0	3.2	2.2	2.1	.0	48.3	14.8	.3	46.2
Informal earner	3.2	.0	4.7	2.6	1.7	.0	77.8	7.7	1.2	21.8
Female-headed hhs	3.5	.0	5.7	1.4	4.5	.0	73.8	9.7	.1	38.9
Men:										
All	3.2	.0	5.7	1.6	3.0	.0	54.7	12.0	.3	46.6
Formal earner	3.1	.0	3.5	2.5	1.2	.0	35.6	10.1	.2	55.2
Informal earner	2.5	.0	5.6	.9	2.3	.0	44.5	3.2	.0	15.8
Male-headed hhs	3.0	.0	5.7	1.7	2.1	.0	43.0	16.7	.5	51.5
Under-18-year-olds:										
None	1.6	.0	.3	.0	.0	.0	18.8	.9	.3	46.8
1–2	2.4	.0	5.1	1.9	1.6	.0	64.7	20.5	.4	46.3
3+	3.5	.0	6.2	1.7	8.2	.0	84.0	12.5	.2	41.0

Notes: Benefit coverage is the number of individuals living in households in receipt of social protection benefits, as a proportion of different population groups. Columns B^{nrb}, B^{as-irb} and B^{as-ui} show the baseline coverage (%) of non-shock-responsive benefits, income-related means-tested benefit automatic stabilisers and unemployment insurance as an automatic stabiliser, respectively. Columns Δ^{nrb}, Δ^{as-irb} and Δ^{as-ui} show the change in coverage (% points) relative to the baseline due to the employment shock. Population groups are defined based on baseline characteristics. For definition of vulnerability groups, see notes of Table 2. Results based on a simulated employment shock reducing aggregate household earnings by 30%. The sample includes households with individuals affected by the shock. *Source:* Own calculations.

Table A.5: Average benefit amount, relative to the poverty line, in the baseline and change due to a shock, in Mozambique and South Africa

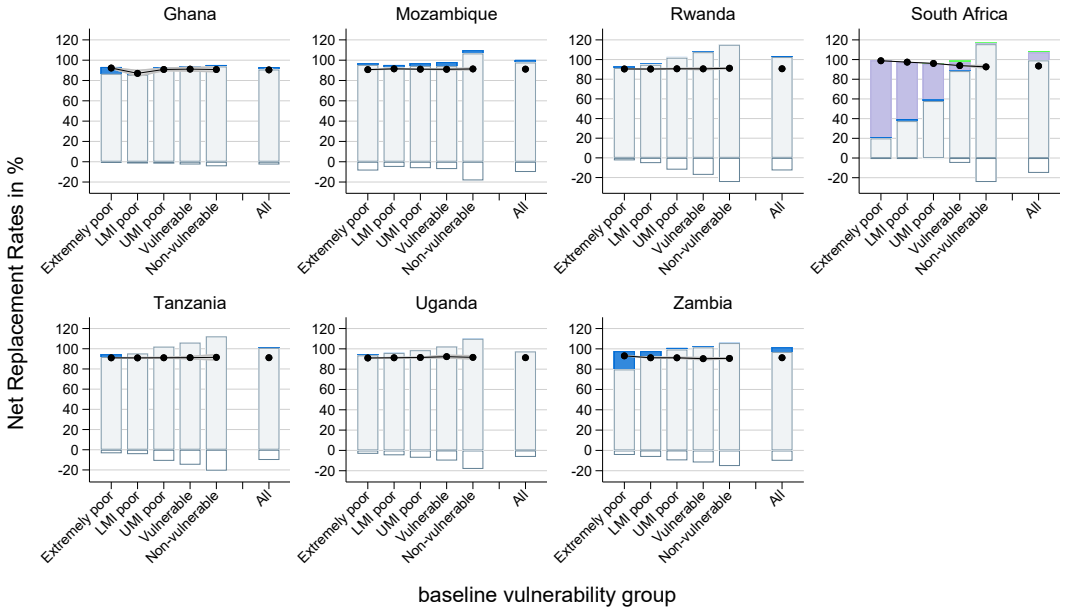
	Mozambique				South Africa					
	B^{nrb}	Δ^{nrb}	B^{as-irb}	Δ^{as-irb}	B^{nrb}	Δ^{nrb}	B^{as-irb}	Δ^{as-irb}	B^{as-ui}	Δ^{as-ui}
All	1.9	.0	.5	.1	1.3	.0	43.6	8.5	.4	103.5
Vulnerability:										
Extremely poor	.9	.0	.6	.0	1.3	.0	36.6	.0	.0	2.2
LMI poor	1.1	.0	.6	.2	2.3	.0	67.5	.0	.0	6.1
UMI poor	2.1	.0	.3	.3	1.8	.0	66.1	2.7	.1	20.6
Vulnerable	6.7	.0	.1	.1	1.2	.0	38.5	12.7	.8	103.7
Non-vulnerable	10.0	.0	.1	.1	.1	.0	7.2	12.6	.0	340.5
Age:										
0-17	1.4	.0	.5	.1	2.0	.0	48.9	10.9	.2	61.5
18-29	1.9	.0	.5	.1	1.2	.0	35.8	4.2	1.1	125.2
30-39	1.4	.0	.4	.1	.6	.0	31.0	8.0	.0	144.6
40-49	1.1	.0	.4	.1	.4	.0	30.3	6.0	.4	135.4
50-59	3.7	.0	.6	.1	1.3	.0	37.0	8.0	.1	101.1
60+	9.1	.0	.4	.1	1.6	.0	120.8	20.0	.4	62.9
Women:										
All	2.0	.0	.5	.1	1.4	.0	46.9	8.9	.2	79.9
Formal earner	8.9	.0	.3	.2	.7	.0	32.1	9.1	.2	114.2
Informal earner	1.4	.0	.5	.2	.6	.0	58.7	5.8	1.4	27.2
Female-headed hhs	3.3	.0	.6	.1	1.7	.0	52.4	6.4	.0	63.2
Men:										
All	1.8	.0	.5	.1	1.2	.0	40.3	8.0	.5	127.2
Formal earner	2.4	.0	.3	.2	.5	.0	26.1	7.4	.5	212.0
Informal earner	1.1	.0	.5	.1	.8	.0	39.9	2.6	.0	14.7
Male-headed hhs	1.5	.0	.5	.1	.8	.0	33.1	10.9	.8	151.5
Under-18-year-olds:										
None	4.3	.0	.1	.0	.0	.0	26.7	4.2	.8	219.0
1–2	2.1	.0	.5	.2	.9	.0	42.8	10.3	.4	88.6
3+	1.7	.0	.5	.1	2.7	.0	57.1	9.4	.1	36.1

Notes: The average benefit amount per person is calculated as the product of the share of individuals receiving the benefit (coverage) and the average benefit received among recipients. Amounts are presented relative to the international poverty line of international-$2.15 (in 2017 prices). Columns B^{nrb}, B^{as-irb} and B^{as-ui} show the baseline amount of non-shock-responsive benefits, income-related means-tested benefit automatic stabilisers and unemployment insurance as an automatic stabiliser, respectively. Columns Δ^{nrb}, Δ^{as-irb} and Δ^{as-ui} show the change relative to the baseline due to the employment shock. Population groups are defined based on baseline characteristics. For definition of vulnerability groups, see notes of Table 2. Results based on a simulated employment shock reducing aggregate household earnings by 30%. The sample includes households with individuals affected by the shock. *Source:* Own calculations.

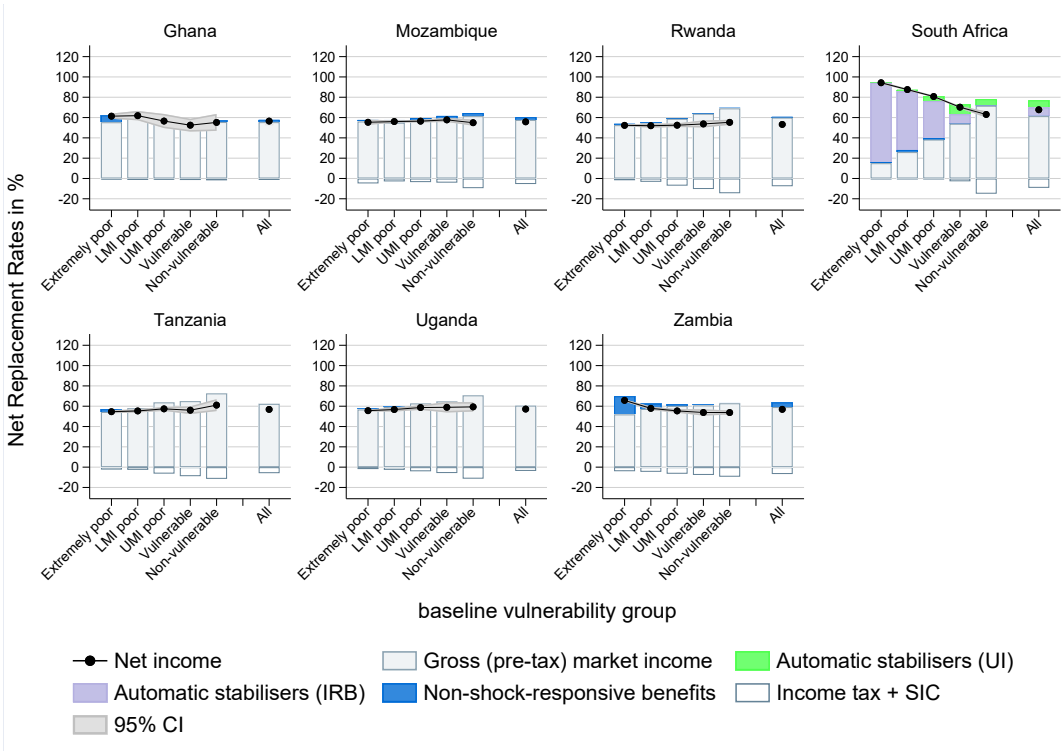
B Figures

Figure B.1: Net Replacement Rates by vulnerability group

a) 10% shock



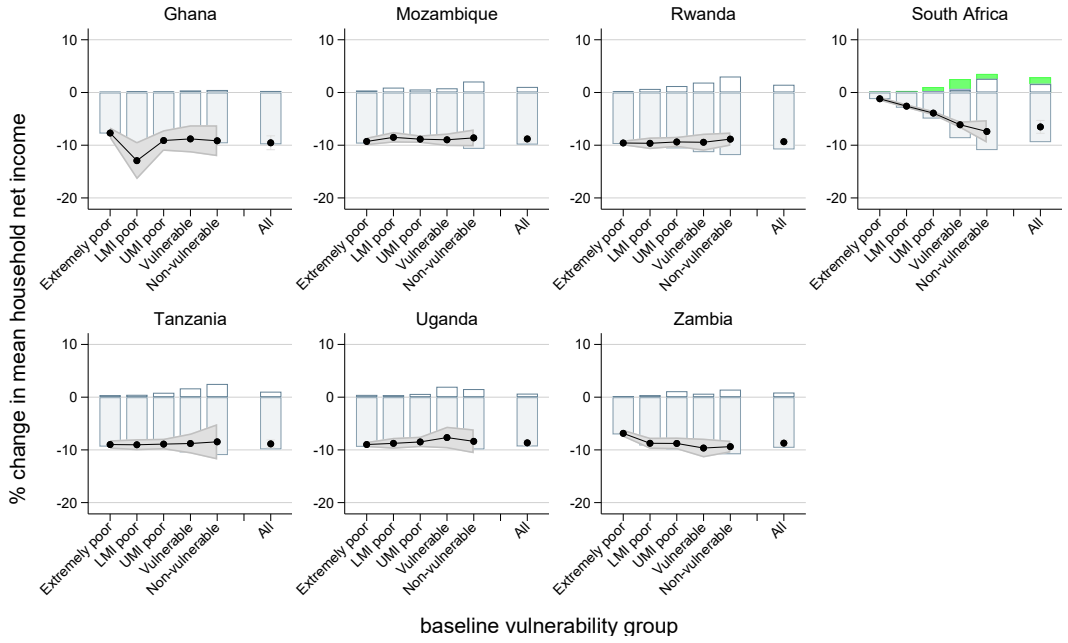
b) 50% shock



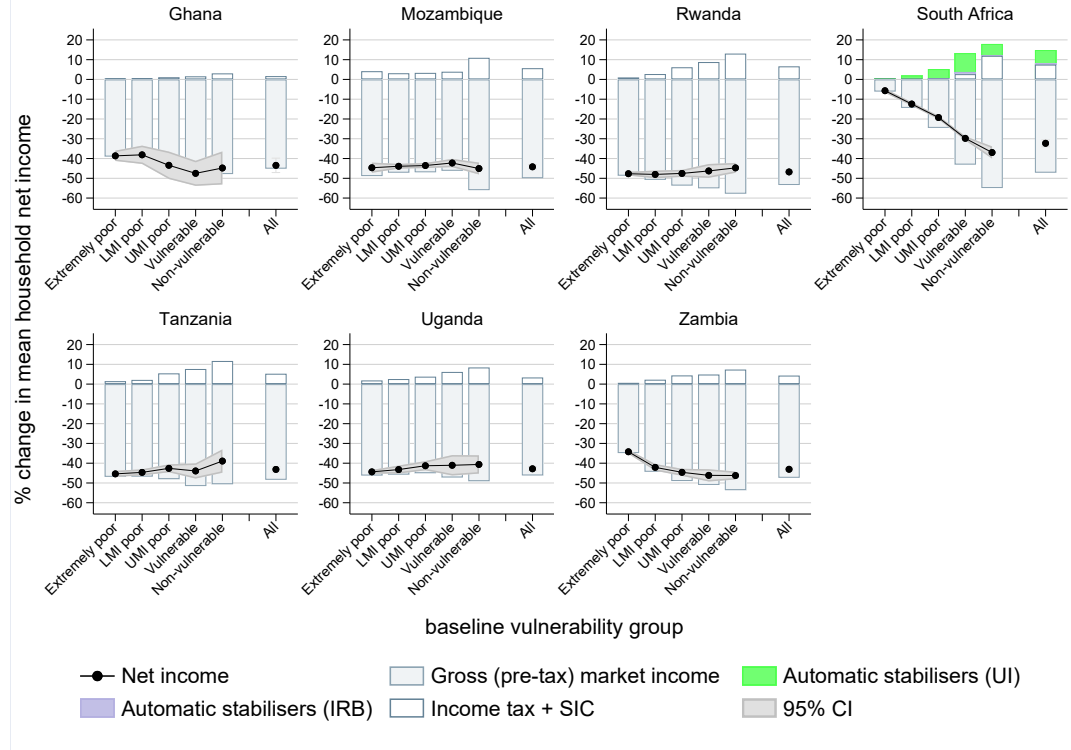
Notes: The figure shows Net Replacement Rates, i.e. the ratio between the average household net income after and before the shock, broken down by income source. The bars "Automatic stabilisers (UI)" and "Automatic stabilisers (IRB)" show the contribution of unemployment insurance and income-related means-tested benefits, respectively, acting as automatic stabilisers. For definition of vulnerability groups, see notes of Table 2. Results based on household net income per capita. *Source:* Own calculations.

Figure B.2: Impact of an employment shock on mean net income by vulnerability group

a) 10% shock



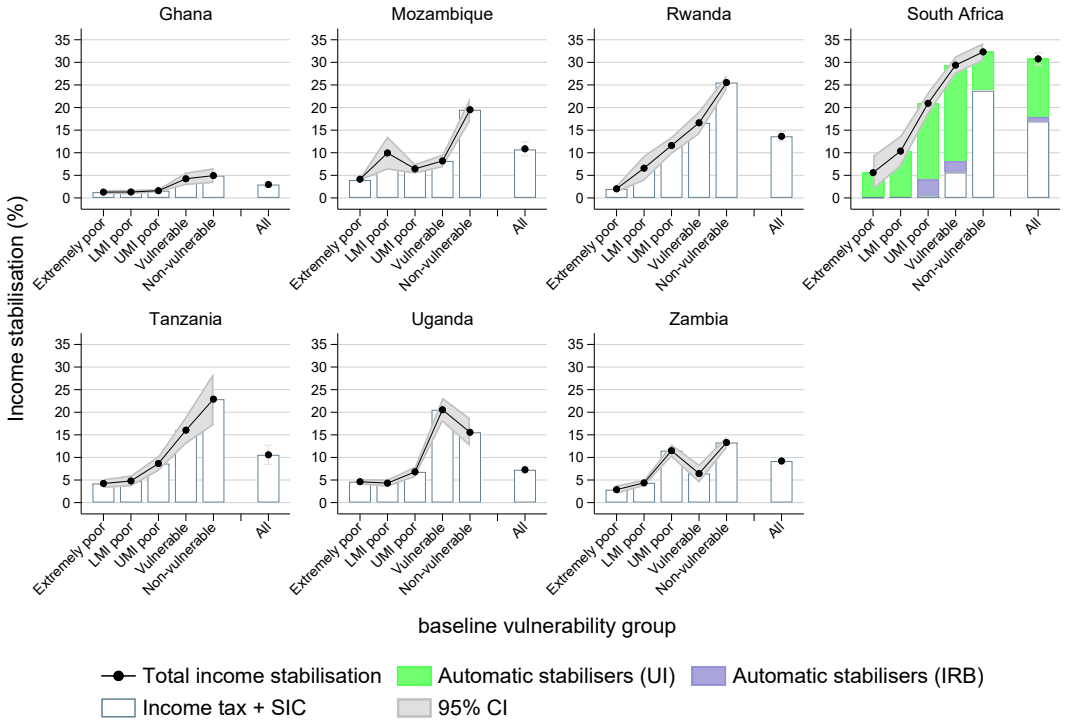
b) 50% shock



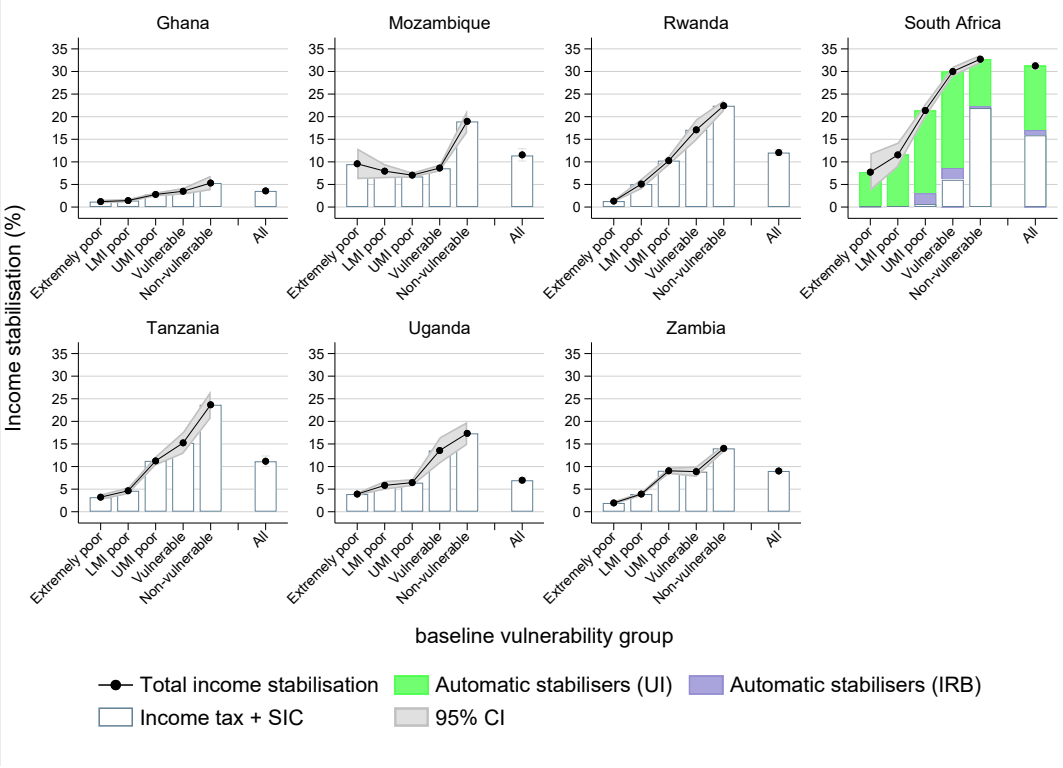
Notes: The figure shows the distributional impact of the shock. Changes in income based on household net income per capita. The bars "Automatic stabilisers (UI)" and "Automatic stabilisers (IRB)" show the contribution of unemployment insurance and income-related means-tested benefits, respectively, acting as automatic stabilisers. For definition of vulnerability groups, see notes of Table 2. *Source:* Own calculations.

Figure B.3: Income stabilisation coefficient by vulnerability group

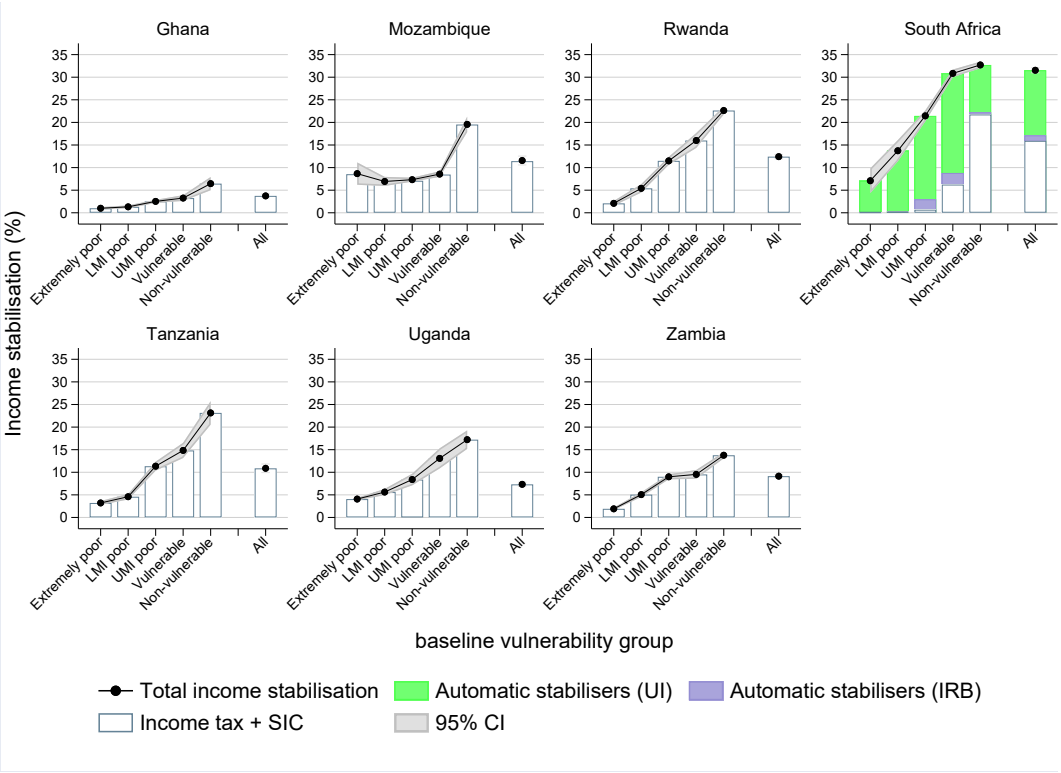
a) 10% shock



b) 30% shock



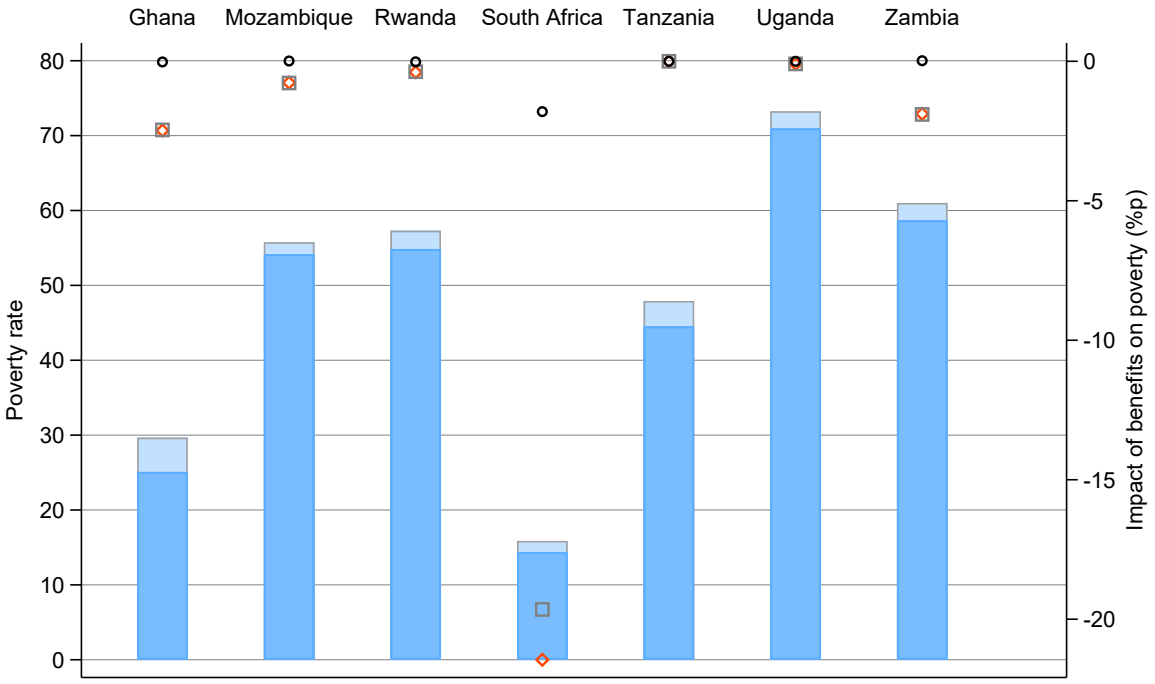
c) 50% shock



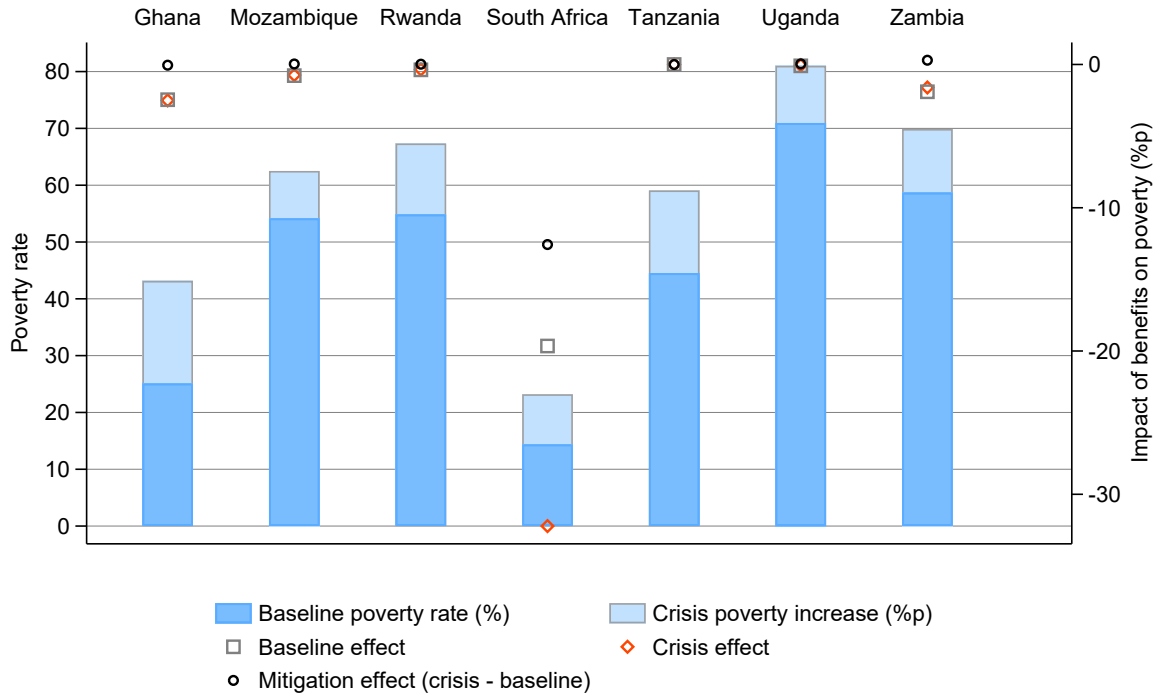
Notes: The figure shows the income stabilisation coefficient, which measures the proportion of gross earnings loss that is offset by higher entitlements to benefit automatic stabilisers and/or lower income tax and SIC liabilities. Changes in income based on household net income per capita. The bars "Automatic stabilisers (UI)" and "Automatic stabilisers (IRB)" show the contribution of unemployment insurance and income-related means-tested benefits, respectively, acting as automatic stabilisers. For definition of vulnerability groups, see notes of Table 2. *Source:* Own calculations.

Figure B.4: Poverty rates for the total population

a) 10% shock



b) 50% shock



Notes: The left vertical axis shows the consumption (in South Africa the income) poverty rate in the baseline (%) measured against the international poverty line of $2.15 per day (in 2017 prices); and the increase due to crisis (% points). The right vertical axis shows the impact of benefits, both non-shock-responsive benefits and automatic stabilisers, on the poverty rate (% points): baseline effect, crisis effect, and mitigation effect (the difference between crisis and baseline effects). *Source:* Own calculations.

C Tax-benefit calculations

This section provides information for key definitions and assumptions in the tax-benefit calculations: First, the models calculate entitlement to the main social protection benefits in each country, i.e. programmes that are rolled out nationally or to most areas of the country. Some small-scale social protection benefits are not captured in our analysis due to limited information available in the survey data.[6] We believe that failing to capture these small benefits in the analysis does not alter our main findings for how responsive benefit systems are to crisis.

Second, the financial values of the survey incomes and consumption were uprated by the consumer price index (CPI) to reflect 2019 conditions. Population or labour market changes since the survey data year are not accounted for.

Third, our baseline is 2019, with tax–benefit policies effective as of 30 June (1 July for Uganda and Zambia). Simulation results are validated and adjusted, if necessary, to match 2019 official figures on the number of benefit recipients.

Fourth, while there is evidence on MPC for richer countries (e.g. Crossley et al. 2021; Bengtsson 2012)[7], there is little evidence on MPC for households in low- and lower-middle-income countries. The data we use do not allow us to estimate MPC for the countries we study and therefore we make assumptions about its value. We assume an MPC of 1 which can be considered as an upper bound for the impact of social protection benefits on consumption.

[6] These include: in Mozambique, sickness and death grants, funeral, hospitalization and maternity allowances; in Tanzania an in-kind benefit for farmers (the Universal Bulk Input Procurement Subsidy Programme) and additional smaller-scale programmes for old-age, survivor and invalidity pensions, funeral grant, maternity, unemployment and health insurance benefits; and in Uganda an in-kind benefit for farmers (the Operation Wealth Creation).

[7] Crossley et al. (2021) elicit directly MPC using hypothetical questions on UK survey respondents; Bengtsson (2012) estimate MPC based on a natural experiment in South Africa.