The effectiveness of social protection in five African countries through normal times and times of crisis

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Abstract: We study the effectiveness of social protection benefits in reducing income and consumption poverty in five sub-Saharan African countries—Ghana, Mozambique, Tanzania, Uganda, and Zambia—in normal times and times of widespread economic crisis. Using tax–benefit microsimulation models with representative household survey data, first we estimate the coverage of benefits and their poverty-reducing effects in each country. Second, we study the ability of benefit automatic stabilizers to reduce losses in incomes and consumption in times of crisis, by simulating hypothetical reductions to earnings and employment. Although the coverage of benefits is fairly high in Ghana and Zambia, the poverty-reducing impact of benefits in all five countries is low in normal times. The effectiveness of benefits to stabilize income and consumption in times of crisis is also limited because many benefits are linked to proxies of income, not income itself, or have tight eligibility criteria. Social assistance programmes are typically unresponsive to losses in household earnings and employment and provide limited support for unemployed people.

Key words: income and consumption poverty, social protection benefits, benefit automatic stabilizers, crisis

JEL classification: D31, H55, I3

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1   Introduction

Households use different strategies to cope with negative shocks. But there are limits to these strategies, especially when the shock strikes everyone at the same time. Private insurance against a job loss usually does not exist and the ability of individuals to rely on financial support from family members, their community, or wider civil society is constrained when there is a widespread increase in need. Furthermore, although households may try to save to insure themselves against a shock, many struggle to do so in normal times and are therefore particularly vulnerable during periods of economic crisis. Government policy responses via social protection benefits are thus key for redistributing resources and providing social assistance and social insurance (Romer and Romer 2022).

A number of papers have used household micro-data to study the performance of social protection in Sub-Saharan African countries. Though some studies show that a large share of existing benefits go to the poor (e.g., Coady et al. 2004; Handa et al. 2012), many studies highlight the limited benefit coverage of the poor and the limited effectiveness of systems to redistribute resources and reduce poverty (e.g., Adu-Ababio 2022; Bargain et al. 2021; Brown et al. 2018; Gasior et al. 2021a; Inchauste and Lustig 2017; Warwick et al. 2022; World Bank 2022). The number of poor people in Sub-Saharan Africa is increasing due to the COVID-19 pandemic and rising prices (Mahler et al. 2022), but government spending on social protection remains low (International Labour Organization 2021).

Recent work by Bowen et al. (2020) and O'Brien et al. (2018) emphasizes the need for developing 'adaptive' or 'shock-responsive' social protection—i.e. benefit automatic stabilizers—to improve households' resilience to crises. Existing evidence shows the importance of benefits as automatic stabilizers, in particular unemployment insurance and/or means-tested benefits, for reducing the volatility in household incomes (Dolls et al. 2012) and consumption (Browning and Crossley 2001), including during the Great Recession (Fernández Salgado et al. 2014) and COVID-19 pandemic (e.g., Brewer and Tasseva 2021; Cantó et al. 2021; Jara et al. 2021; Lastunen et al. 2021). Means-tested benefits play an important role in reducing poverty volatility over the business cycle (Bitler and Hoynes 2016) and redistributing resources (Paulus and Tasseva 2020). However, with exceptions such as Lastunen et al. (2021) and Adu-Ababio (2022), most of the literature has focused on high-income economies.

In this paper, we examine two low-middle-income countries (LMICs)—Ghana and Tanzania—and three low-income countries (LICs)—Mozambique, Uganda, and Zambia. Though varying in the size and development of the benefit system (Clement 2020) and mix of policies, all of these countries spend less on social protection than the average for Sub-Saharan Africa. Our approach uses new tax–benefit models for Sub-Saharan African countries (SOUTHMOD models) combined with nationally representative household surveys (Gasior et al. 2021a). It allows us to calculate household benefit entitlements, tax liabilities, and net incomes in pre-pandemic 2019 (what we call 'normal' times). We stress-test the benefit systems (Atkinson 2009) by simulating hypothetical reductions to household earnings or employment and assess the impact of these shocks on household benefits and net incomes. We then also study the effects of benefits on household consumption.

Our paper has two goals. The first is to explore the extent to which social protection systems in the five countries provide support to households in 'normal' times. The better the coverage and adequacy of the systems in normal times, the better people are prepared to face an economic shock. We add to the literature by comparing in-depth systems across the five countries and examining their impact on consumption poverty, as typically done in the literature, as well as income poverty measures to get a more comprehensive picture of household resources. Our second goal is to examine the extent to which social protection systems are reactive to economic crisis: a well-designed system with strong automatic stabilizers (AS) should be flexible to respond quickly and accurately to changes in people's circum-

stances. The more responsive benefits are, the more insurance and income/consumption smoothing they provide.

We document that benefit coverage varies substantially across the countries: while one in two individuals live in households in receipt of social protection benefits in Ghana and Zambia, the rate is much lower in the other countries: less than one in ten in Mozambique and Tanzania and one in twenty in Uganda. A large proportion of the consumption-poorest 20 per cent of the population receive benefits in Ghana (74 per cent), Zambia (68 per cent), and Tanzania (40 per cent). But, though an important source of income for some in poverty, benefits do relatively little to reduce the number of people living below US\$1.9 per day and the depth of poverty. The highest consumption and income poverty reductions are estimated in Ghana and Zambia, respectively, while benefits have negligible impact on poverty in Mozambique, Tanzania, and Uganda.

Furthermore, benefit coverage and levels show only a limited response to reductions in household earnings or employment. However, the high benefit coverage in Ghana and Zambia means that many households at the bottom of the income distribution are protected by an income floor. This is not the case for Mozambique, Tanzania, and Uganda, where social protection is vastly more limited. Our results add to the existing literature by providing novel evidence on the effectiveness of benefit AS in LICs and LMICs settings and comparing their magnitude across countries.

The rest of the paper is organized as follows. Section 2 sets out the case for benefit AS and highlights challenges facing LICs and LMICs that might limit their role. Section 3 introduces the countries' demographic and economic profile and their social protection arrangements. Section 4 presents the data and methods used, including key analytical concepts and assumptions. Section 5 presents the results and Section 6 concludes.

2   Automatic stabilizers

This section discusses the key advantages of social protection benefits as AS over discretionary policy measures. It also discusses challenges that may limit their effectiveness, in particular in the context of LICs and LMICs.

To cope with a negative shock, individuals can self-insure by borrowing or drawing on their savings, can insure privately on the market, or rely on support from family or civil society. However, the ability to self-insure is smaller for individuals with lower incomes. When there is a crisis and shocks are correlated (e.g. a large number of people become unemployed), private insurance may fail and the uncertainty associated with relying on family and civil society may rise. Apart from providing support in normal times, it is the government's policy response via social protection benefits that can redistribute resources and provide social assistance and social insurance against shocks.

Automatic stabilizers describe the in-built flexibility of existing benefits to respond automatically to expansion and contraction of the economy (e.g. unemployment benefits). Their purpose is to reduce variation in people's incomes and consumption, provide social insurance against risks, and reduce household financial stress in challenging times. Acting as fiscal stimulus measures, they also stimulate private consumption and economic activity to make up for the fall in aggregate demand during recessions and reduce fluctuations in aggregate output (Orszag et al. 2022). In the absence of (strong) AS, governments can respond to crises by introducing temporary emergency measures, such as reforming existing policies or introducing new measures. Put differently, absence of AS does not mean absence of fiscal response.

There are clear advantages of AS over temporary emergency measures. First, with AS no extra government intervention is needed as policies respond automatically to economic shocks and, hence, there is no time delay between the government's decision and introduction of a new policy (Orszag et al. 2022). Second, income support/insurance is provided for as long as needed and targeted at those in need, again without the need for extra government intervention. In contrast, with emergency measures, policy-makers need to deliberate over how long to keep measures for, which can, in turn, create a new layer of uncertainty and stress for families. If support is withdrawn too soon, crises can be worsened or extended, and so total costs for the economy and households will be greater than needed. In addition, there is an inevitable time-lag when introducing emergency measures as well as associated risks of targeting errors and corruption (e.g. Devereux 2021). Third, provision of AS can be facilitated by relying on existing administration and infrastructure—that is, there is no need to build new infrastructure as one might need to do for a brand-new policy. Fourth, policy-makers are freed up to focus on the idiosyncratic and unanticipated aspects of the crisis (Orszag et al. 2022).

To strengthen AS, additional mechanisms can be incorporated into policies to increase their effectiveness during crises—for example, by increasing benefit spending when a certain threshold such as the unemployment rate is passed (Blanchard and Summers 2020). These can be linked to increasing the generosity of benefit amounts, benefit coverage, or length of receipt. For example, in South Africa a disaster management act triggers a benefit expenditure increase, removing existing expenditure caps (Republic of South Africa 2003). In the United States there have been proposals to automatically waive work requirements and increase the maximum benefit level of the Supplemental Nutrition Assistance Program (SNAP; a food stamp programme) during recessions (Hoynes and Schanzenbach 2019). In the UK the state pension increases annually by the 'triple lock' index—the greater of growth in prices, earnings, or by 2.5 per cent—protecting pensions if earnings or prices fall.

There are policy challenges facing LICs and LMICs that can seriously limit how effective AS are in mitigating shocks to households. First, by design, some policies may not directly respond to fluctuations in household incomes or only respond with a delay, thereby postponing much-needed protection.[1] Proxy means-tested benefits, common in LICs and LMICs, are tied to indicators that are correlated with income but do not react to changes in income per se, and the assessment period can be a long time (e.g. more than two years in the case of the Human Development Transfer (*Bono de Desarrollo Humano*) in Ecuador—see Jara et al. (2021)). Nevertheless, proxy means-tested benefits can act as a safety net for the families who already receive them prior to a crisis. Similarly, entitlement to universal benefits (e.g. child benefits) does not depend on how much one works or earns and is therefore not affected by adverse income shocks, but families can fall back on these benefits if they experience employment and earnings losses.

Second, various limitations of existing policies may constrain the effectiveness of AS, such as low coverage of social insurance benefits due to a large informal sector prevailing in many LICs and LMICs, incomplete roll-out of social assistance, low value of benefit payments, or limited administrative capacity (Lokshin et al. 2022). These all translate into inadequate support in normal times and limit the role of AS, requiring extra government intervention at a time of crisis. Jara et al. (2021), Lastunen et al. (2021), and Brum and Rosa (2021) show that gaps in the coverage of social protection, especially for informal workers, has limited the extent to which AS were able to offset the negative impact of the COVID-19 pandemic on household incomes in Ecuador, African countries, and Uruguay, respectively.[2]

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[1] Cantó et al. (2021) show that social assistance schemes in Italy and Spain, to which eligibility depends on the past year's incomes, did not react to the sudden loss of earnings experienced by households at the start of the COVID-19 pandemic.

[2] For richer countries, Dolls et al. (2012) show that, due to differences in the policy design and size of the welfare state, AS are weaker in Eastern and Southern than in Central and Northern Europe, and are overall weaker in the United States than in the EU, on average. Generally, the bigger the welfare state the bigger the stabilization effect of policies. Separately, Autor et al. (2022) argue for building administrative capacity in the United States to enable better programme targeting and a more progressive incidence in times of crisis.

Third, fiscal capacity is central to the enactment and provision of policies. Fiscal concerns, including the inability of governments to borrow easily, may be particularly potent in the context of LICs and LMICs.[3] The government's fiscal constraints imply limits to social protection provision. For example, if the state does not have enough resources to pay out benefits, it may cap benefit expenditure and number of benefit recipients, limiting the cushioning impact of policies; for example, in South Africa the COVID-SRD grant was assigned a budget cap in 2022, causing the government to lower the means-test threshold to reduce the number of recipients (Paton 2022). Foreign or international agencies funding social protection programmes may also impose limits on the number of benefit recipients, restricting government action in recipient countries. Foreign aid paid out in foreign currency can also add budget uncertainty brought by fluctuations in exchange rates.

Finally, in addition to social protection benefits, direct taxes such as personal income tax and social insurance contributions (SIC) can play an important role in mitigating income and consumption losses (Brewer and Tasseva 2021; Kniesner and Ziliak 2002). Thus, while our focus is primarily on poverty relief and benefits, the points discussed above also apply to taxes and SIC too. In the countries we examine, the income tax schedule is broadly progressive while SIC are levied as a proportional tax (i.e. the same rate applies to all earnings). Hence, as earnings drop due to an economic shock, income tax liabilities and SIC amounts also fall, so that after-tax income falls by less than pre-tax income.

3   Country profiles and policy background

This section starts by comparing key demographic and economic characteristics across the five Sub-Saharan countries included in this study: Ghana, Mozambique, Tanzania, Uganda, and Zambia. It then compares the main social protection benefits across countries. As we examine household net incomes as well as consumption, the section also lists the main direct taxes and SIC policies that affect incomes and hence consumption in both normal times and during crises.

Table 1 provides some key demographic and economic statistics. First, countries vary substantially in population size, from 18.4 million in Zambia to 59.7 million in Tanzania, and in combination comprise 186 million people (17 per cent of people living in Sub-Saharan Africa). In all five countries the median age is low, with the lowest in Uganda (15.7) and the highest in Ghana (20.2), compared to the world average (29.7). Life expectancy at birth is also relatively low, between 61 years in Mozambique and 66 in Tanzania, with a world average of 72. In terms of gross national income per capita, Ghana and Tanzania are LMICs while the other three—Mozambique, Uganda, and Zambia—are LICs. All countries spend little on social protection as a percentage of GDP compared to, for example, the average in low-income (1.1 per cent) or lower-middle-income countries (2.5 per cent), Africa (3.8 per cent), or the world (12.9 per cent). Social protection expenditure is twice as high in Ghana and Tanzania compared to the other three countries, partly reflecting their lower-middle-income (rather than low-income) status. Despite countries' lower-income status and thus potentially limited fiscal space to expand spending in crises, all countries (except Tanzania for which there are no data) raised debt to GDP levels substantially through the COVID-19 pandemic (between 19 per cent in Uganda and 32 per cent in Zambia in 2020 compared to 2019) to provide support to households and businesses, highlighting the importance of assessing the effectiveness of existing social protection in responding to crises.

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[3] For OECD countries, Romer (2021) finds that governments' fiscal policies in 2020 during the COVID-19 pandemic were constrained by countries' ability to borrow rather than 'anti-debt' ideas—a stark change from the 2008 financial crisis.

Table 1: Country characteristics

	Ghana	Mozambique	Tanzania	Uganda	Zambia
Population (million)	31.1	31.3	59.7	45.7	18.4
Median age	20.2	16.7	16.7	15.7	16.8
Life expectancy at birth	64.1	61.2	66.4	62.9	62.4
Income classification	Lower-middle	Low	Lower-middle	Low	Low
Social protection expenditure (% GDP)	1.7	0.8	1.7	0.7	0.8
Central government debt to GDP (% growth 2019–20)	26.1	21.8	(no data)	19.4	32.2

Source: 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 (https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=ZG). Income classification: World Bank Country and Lending Groups (https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups). Social protection expenditure (excluding health) in 2020 or nearest available year: table A4.3 in International Labour Organization (2021). Central government debt in 2019 and 2020: IMF Global Debt Database (https://www.imf.org/external/datamapper/datasets/GDD.

Social protection programmes in Sub-Saharan Africa have undergone substantial development since they were first introduced. While during colonial times social protection was available for a small, privileged group (expatriates and local officials in colonial administration), expenditure for social protection has been steadily increasing, in particular since the 2000s, as a share of governments' budgets (UNDP 2019). For example, in Ghana the social assistance programme targeted at poor families—the LEAP transfer programme—was piloted in 2013 and expanded in several waves since then. Similarly, the social assistance programme in Zambia—the Social Cash Transfer—was first introduced as a pilot in selected districts and rolled out to the whole country in 2016. In Mozambique, the Basic Social Subsidy Programme was transformed and expanded in 2010. In Uganda, the Senior Citizens' Grant started as a pilot in the most vulnerable region of the country before being gradually extended and fully nationally rolled out by 2020 to all persons older than 80.

Table 2 gives an overview of the main social protection programmes captured in our analysis. *Means-tested benefits* are typically targeted at poorer groups who have to meet a range of eligibility criteria related to, for example, family characteristics, consumption, or income. *Non-means-tested benefits* are typically universal and available to everyone within a certain demographic group, such as children. *Social insurance pensions* are available to workers who have previously paid SIC and met, for example, retirement criteria. All programmes are described in detail in Table A2. Ghana, Mozambique, and Zambia operate a mix of benefit programmes and so different and/or overlapping population groups can be covered. In comparison, Tanzania and Uganda have one main means-tested and non-means-tested benefit programme, respectively, providing more targeted support.

Across countries, eligibility for many of the means-tested benefits is linked to proxies of income, and not income itself, and/or eligibility criteria are tight. Proxies are linked to, for example, food insecurity (Mozambique, Zambia) or vulnerability/extreme poverty index (Ghana, Zambia), combined with checks for the presence of children in the household (Ghana, Tanzania, and Zambia), disabled or chronically ill people (Ghana, Mozambique, Zambia), or elderly people (Ghana, Zambia). In Mozambique (the Basic Social Subsidy Programme) and Tanzania (the Productive Social Safety Net) the means test also includes an income test (see Table A2). Though not explicitly targeted by social protection programmes, unemployed individuals can receive support if they meet criteria for means-tested or non-means-tested benefits, or live in households where other members are benefit recipients. Unemployment insurance programmes generally do not exist.[4]

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[4] The only exception is Tanzania, which runs a small-scale unemployment insurance programme. The programme is not captured in our analysis due to data limitations, which we return to in the next section.

Table 2 provides an overview of the countries' direct taxes and SIC (see Table A2 for details).[5] All countries operate a personal income tax, presumptive tax for small-business owners (e.g. street-vendors), and SIC. Payment of SIC is used to determine entitlement to social insurance pensions where these exist and can be levied to both formal and informal income. The direct tax schedules are broadly progressive in all countries (i.e. tax liabilities go up as a proportion of income with rises in gross (pre-tax) income taxes). SIC are levied as a proportional tax (i.e. the same rate applies to all earnings).

Table 2: Overview of social protection benefits, direct taxes, and SIC in 2019

	Ghana	Mozambique	Tanzania	Uganda	Zambia
Non-means-tested benefits (NMTB)					
Children, youth	School Feeding Programme; Free Senior High School policy				Home Grown School Meal Programme
Old-age				Senior Citizens' Grant	
Farmers					Electronic-Farmer Input Support Programme
Means-tested benefits (MTB)					
Social assistance	LEAP transfer Programme	Basic Social Subsidy Programme	Productive Social Safety Net		Social Cash Transfer; Keeping Girls in School; Supporting Women's Livelihood
Farmers					Food Security Pack
Social insurance pensions (P)					
	Old-age	Old-age; Survivor			Old-age; Invalidity
Direct taxes and SIC					
Direct taxes	Personal income tax; Presumptive tax; Capital income tax	Personal income tax; Presumptive tax; Other personal income tax	Personal income tax; Presumptive tax	Personal income tax; Presumptive tax	Personal income tax; Presumptive tax; Local service tax; Rental income tax
SIC	Employee SIC – pension and health	Employee SIC	Employee SIC – pension and health	Employee SIC	Employee SIC – pension

Source: authors' representation based on the SOUTHMOD Country Reports (Adu-Ababio et al. 2022; Castelo et al. 2022; Kalikeka et al. 2022; Leyaro et al. 2022; Waiswa et al. 2022).

4 Methodology and data

4.1 Social protection in normal times and times of crisis

Our paper has two goals. The first is to assess benefit coverage of the population and the poverty-relief systems in place in normal times. The second goal is to measure the responsiveness of benefits to crises that strike the economy as a whole.

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[5] As our focus is on incomes and how changes to income (earnings) affect household consumption, we therefore examine direct taxes and SIC. Indirect taxes and excise duties which do not affect household incomes directly are thus not captured in the analysis.

Normal times

Formally and following the notation in Paulus and Tasseva (2020) and Bargain and Callan (2010), let us denote with y^B gross (pre-tax) market incomes in normal times (i.e. our baseline scenario); $t(y^B)$ is income tax and SIC as a function of y^B; and $b(t,y^B)$ is social protection benefits as a function of t and y^B. Household net income Y^B and household consumption C^B are then:

$$Y^B = y^B - t(y^B) + b(t,y^B) \tag{1}$$

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

where c_0 is consumption that is independent of people's incomes and c_1 is the marginal propensity to consume (MPC)—that is, the effect of an additional unit of income on consumption. An MPC of 1 means that all of an increase in income is consumed, while an MPC of less than 1 implies that some of the income increase is consumed and the rest saved. MPC is expected to be high (close to 1) for credit-constrained households that cannot borrow or have little liquid wealth to draw on, or if the income change is expected to be permanent (Crossley et al. 2021).

As poverty reduction is a key goal of social protection, it is important to quantify the impact of benefits on poverty to assess their effectiveness. We apply an approach commonly used in distributional analysis and official poverty statistics by comparing poverty estimates using alternative resource measures—that is, using net income versus income before benefits but after taxes and SIC:

$$\Delta P^{B,Y} = \underbrace{P[(y^B - t(y^B) + b(t,y^B))]}_{\text{poverty using net income}} - \underbrace{P[(y^B - t(y^B))]}_{\text{poverty using net income before benefits}} \tag{3}$$

where P is the poverty measure and $\Delta P^{B,Y}$ is the income poverty reduction due to benefits.

Using equations (2) and (3) we can similarly approximate the impact of benefits on consumption poverty:

$$\Delta P^{B,C} = \underbrace{P[c_0 + c_1(y^B - t(y^B) + b(t,y^B))]}_{\text{poverty using consumption}} - \underbrace{P[c_0 + c_1(y^B - t(y^B))]}_{\text{poverty using consumption before benefits}} \tag{4}$$

Impact of crisis

An economic shock (crisis) strikes which lowers earnings and/or raises unemployment so that gross market income after the shock is y^S ($y^S \ll y^B$); tax liabilities and SIC as AS respond to the loss of earnings and become $t(y^S)$; and benefit stabilizers respond to the changes in earnings, tax liabilities, and SIC and become $b(t,y^S)$. Household disposable income and consumption as a result of the shock are:

$$Y^S = y^S - t(y^S) + b(t,y^S) \tag{5}$$

$$C^S = c_0 + c_1 Y^S \tag{6}$$

We can estimate the impact of the crisis on income and break it down into the contribution of changes to gross market incomes (E^Y) and the role of automatic stabilizers—that is, taxes and SIC ($S^{Y,t}$) and benefits ($S^{Y,b}$):

$$E^Y = y^S - y^B$$
$$S^{Y,t} = t(y^B) - t(y^S) \tag{7}$$
$$S^{Y,b} = b(t,y^S) - b(t,y^B)$$

For poverty rates, building on equations (3) and (4), we compare the poverty impact of benefits during crises ($\Delta P^{S,Y}/\Delta P^{S,C}$) versus the baseline ($\Delta P^{B,Y}/\Delta P^{B,C}$). That tells us the extent to which benefits mitigate

the increase in poverty due to the shock:

$$S^{Y,b} = \Delta P^{S,Y} - \Delta P^{B,Y} =$$

$$\underbrace{P[y^S - t(y^S) + b(t, y^S)] - P[y^S - t(y^S)]}_{\text{impact of benefits on income poverty during crisis}} -$$

$$\underbrace{(P[y^B - t(y^B) + b(t, y^B)] - P[y^B - t(y^B)])}_{\text{impact of benefits on income poverty in baseline}}$$

(8)

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

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

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

(9)

4.2 Simulation of shocks

To measure the extent to which social protection benefits respond to an adverse shock and cushion its effect on people's incomes and consumption, we stress-test the benefit system (Atkinson 2009). Two types of shock are simulated in each country, as per Dolls et al. (2012): (1) a shock to employment leading to some earners losing all of their earnings, with aggregate earnings falling by 10 per cent; and (2) a proportional reduction to earnings of 10 per cent—that is, everyone's earnings are affected equally.[6] Rather than studying the development of incomes over an actual episode of crisis like the COVID-19 pandemic, the advantages of simulating stylized shocks are three-fold. First, they provide a controlled experiment in which we can keep the size of shocks the same to explore cross-country differences in population characteristics and benefit policies. Second, they allow us to focus on the response of benefit stabilizers, abstracting from any interactions with discretionary, emergency benefit policies that governments may introduce during actual crisis. Third, comparing the impact of different types of shock can inform to what extent the type of shock matters for benefit responsiveness and which policies are particularly important in dealing with that shock.

Both types of shock can be expected to trigger a response from benefit stabilizers, if their design allows that, leading to an increase in the number of benefit recipients and total benefit spending. For example, a proportional reduction to earnings can trigger a response from income-related benefits such as means-tested benefits targeted at poor families. Loss of employment can trigger a response from income-related benefits as well as unemployment-related benefits such as unemployment insurance. In the absence of benefit response, benefits can still provide a safety net for families who already receive them prior to the shock. In this case, the bigger the benefit coverage in normal times—before the shock—the bigger the cushioning effect of policies during crises.

4.3 Outcome measures

To examine how comprehensive the benefit system is, we estimate the coverage of social protection benefits. Benefit coverage equals the number of people living in households receiving benefits, as a proportion of the whole population. We present coverage rates for receipt of all benefits as well as broken down by benefit type, differentiating between means-tested benefits, non-means-tested benefits, and social insurance pensions (see Section 3).

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[6] Earnings are defined as the sum of earnings from employment and self-employment and agricultural income. In case (1), earners are selected randomly from the country's population to be affected by the employment shock.

To assess the poverty relief that benefits provide, we examine the Foster—Greer-–Thorbecke (FGT) poverty headcount and gap. The poverty headcount is the share of the population living below the poverty line. The poverty gap is the mean shortfall of the total population from the poverty line (with the non-poor having a zero shortfall) as a percentage of the poverty line. The poverty line is the international poverty definition of US$1.9 per day (in 2011 purchasing power parity (PPP)).[7]

To measure the responsiveness of benefits to crises, we assess changes to benefit coverage and the effectiveness of benefits to mitigate losses in incomes and increases in income/consumption poverty due to shocks. To capture the importance of benefits as a safety net, we also look at the proportion of income before the shock that is replaced by benefits as the shock hits (i.e. net replacement rates).

4.4   The data and SOUTHMOD tax–benefit models

Our approach relies on the use of the new SOUTHMOD tax–benefit microsimulation models (Decoster et al. 2019) developed jointly by the United Nations University World Institute for Development Economics Research (UNU-WIDER), the Southern African Social Policy Research Insights (SASPRI), the University of Essex, and national partners in each country.[8] The tax–benefit models rely on nationally representative household budget surveys.[9] The survey data are the main source for official statistics on poverty and inequality in the countries and are the underlying data source for the World Bank Poverty and Inequality Platform, as well as Our World in Data's new section on poverty. The tax–benefit models contain the tax–benefit rules of countries over time. The models use the information in the survey data on individual and household gross (pre-tax) market incomes, consumption, and characteristics (such as labour market or informality status) to identify assessment units (e.g. individuals or households) eligible for benefits/liable for taxes and SIC. Finally, the models calculate, using the policy rules, individual and household amounts of social protection benefits, direct tax liabilities, SIC, and net income. The data have undergone careful consistency checks (McLennan et al. 2021). All models are developed based on a common framework (EUROMOD) used initially for tax–benefit modelling and comparative distributional analysis for the European Union countries (Figari et al. 2015; Sutherland and Figari 2013). The survey data and tax–benefit simulations are thus harmonized to facilitate meaningful, cross-country comparative research. This also allows us to simulate hypothetical reductions of earnings and employment and assess the effects on benefit entitlements, net incomes, and consumption across countries.

Some key definitions and assumptions are as follows: First, the models calculate entitlement to social protection benefits, which are part of national programmes or programmes that are rolled out to most areas of the country. Second, we uprate the financial value of the income data in the surveys to 2019, to account for growth in average gross market incomes and certain benefits to which entitlement is not simulated by the models (i.e. due to lack of information to determine eligibility). We also uprate, by the consumer price index, household consumption reported in the survey to 2019 levels and adjust it to account for the impact of changes to market incomes, direct taxes, and benefits between the survey data year and 2019. We do not account for population or labour market changes since the survey data year. Third, our baseline, or what we call 'normal times', is pre-pandemic 2019, with tax–benefit policies that were in place on 30 June (1 July for Uganda and Zambia). Fourth, the simulation results are carefully validated against and adjusted, if necessary, to match 2019 official figures on the number of

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[7] The international definition refers to living standards in 2011 and is uprated for country-specific changes in PPP from 2011 to 2019 (Ferreira et al. 2016). PPP conversion factors and changes in consumer price index from 2011 to 2019 are from the World Bank's World Development Indicators database.

[8] GHAMOD v2.5 for Ghana, MOZMOD v2.9 for Mozambique, TAZMOD v2.5 for Tanzania, UGAMOD v1.8 for Uganda, and MicroZAMOD v2.12 for Zambia.

[9] The 2017 Ghana Living Standard Survey, 2015 Household Budget Survey (*Inquérito sobre o Orçamento Familiar*, IOF) for Mozambique, 2017/18 Household Budget Survey for Tanzania, 2016/17 National Household Survey for Uganda, and 2015 Living Conditions Monitoring Survey for Zambia.

benefit recipients.[10] Detailed information on the benefit programmes, data, model simulations, and assumptions are available in the SOUTHMOD Country Reports (Adu-Ababio et al. 2022; Castelo et al. 2022; Kalikeka et al. 2022; Leyaro et al. 2022; Waiswa et al. 2022).

The model simulations reflect as closely as possible the policy design and in-built flexibility, if any, of benefits to respond to shocks. In some instances, some social protection benefits are, however, not captured in our analysis due to limited information available in the survey data.[11] We return to and reflect further on the data limitations in the conclusion.

Returning to the value of c_1 (see Section 4.1), while there is evidence on MPC in particular for richer countries (e.g., Bengtsson 2012; Crossley et al. 2021),[12] there is little evidence on MPC for households in LICs and LMICs. The data we use do not allow us to estimate MPC for the countries we study and therefore we make assumptions about its value. Our central assumption is an MPC of 1, which gives an upper bound for the impact of social protection benefits on consumption. In the Supplementary Materials we present alternative results assuming an MPC of 0.7 (as estimated for universal child grants in South Africa by Bengtsson (2012)). Nevertheless, our main findings for the importance of benefits for poverty reduction in normal times and their responsiveness to crises hold irrespective of the assumed value of MPC.

Throughout the analysis, we measure income and consumption at the household level and apply a per-capita equivalence scale to make households of different size comparable with each other. Household net income is the sum of gross (pre-tax) market income—that is, income from employment and self-employment, agricultural income, income from rent, investment income, private transfers paid to/from other households—plus social protection benefits minus direct income taxes and SIC. Household consumption expenditure is the sum of the market value of goods and services purchased by households and derived from own production, received as gifts, and in-kind payments.

5   Results

We start with assessing the role of benefits in 'normal' times (i.e. 2019 prior to the COVID-19 pandemic), estimating benefits coverage and their effectiveness in reducing income and consumption poverty. We then examine the extent to which benefits respond to simulated shocks (crises) by mitigating losses to household incomes and increases in income and consumption poverty.

5.1   Benefits coverage and impact on poverty in normal times

Table 3 shows the benefit coverage rate—that is, the number of individuals living in households receiving social protection benefits as a share of the total population—in 'normal' times, focusing on support in 2019 prior to the COVID-19 pandemic. We estimate that Ghana and Zambia have the highest coverage (53.7 and 53 per cent), followed by Mozambique (8.5 per cent), Tanzania (8 per cent), and Uganda

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[10] Most often, the adjustment is downwards as the number of simulated benefit recipients exceeds the official figure. Potential reasons for the over-simulation include: a limited roll-out of programmes; a community selection criteria to identify eligible households which is difficult to account for in the simulations; or large survey weights for selected groups of the population which may lead to an over-simulation of smaller programmes.

[11] 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).

[12] 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.

(3.8 per cent). The high coverage in Ghana is achieved almost exclusively by non-means-tested benefits, whereas there is a split between means-tested and non-means-tested benefits in Zambia. The high prevalence of non-means-tested benefits in these two countries is to a large extent due to categorical benefits that provide school meals to children as well as agricultural benefits in Zambia. For the other countries, Uganda's coverage is driven by non-means-tested benefits (the Senior Citizen's Grant, which is a universal benefit for older individuals), while most of the coverage in Mozambique and Tanzania is due to means-tested benefits. Social insurance pensions play a small role in all five countries, with the highest coverage rate of 2 per cent in Mozambique.

Table 3: Benefit coverage (% population) in the baseline

	Total benefits	Non-means-tested	Means-tested	Social insurance pensions
Ghana	53.7	52.5	0.8	1.4
Mozambique	8.5	0.0	6.6	2.0
Tanzania	8.0	0.0	8.0	0.0
Uganda	3.8	3.8	0.0	0.0
Zambia	53.0	39.7	23.4	0.9

Note: benefit coverage is the number of individuals living in households in receipt of social protection benefits, as a proportion of the total population.

Source: authors' calculations.

Figure 1 shows the benefit coverage rates for each of the countries by income (blue bars) and consumption quintile group (grey bars). Coverage rates decrease by consumption quintile group only in Ghana. However, the results for Ghana by income quintile group, and for the other four countries by both income and consumption quintile group, do not conform with this pattern. There are two main reasons for this. First, receipt of income support from social protection shifts some households out of the lowest income quintile group, where instead ineligible households feature, and into the higher quintile groups; this is occurring across all five countries as the coverage rates are lower in the first than the second income quintile group. Second, benefits are targeted at groups based on characteristics that are not all correlated with income/consumption; for example, in Mozambique the Basic Social Subsidy Programme although comprising an income test also selects specific groups of the population that exclude many of the poorest in society.

Figure 2 repeats the analysis by age band. Within countries, the highest coverage rate is of those aged 0–19 in Ghana and Tanzania and aged 60+ in Mozambique, Uganda, and Zambia. In the latter two countries, households with elderly members are defined as vulnerable and targeted by social protection. The relatively low coverage in particular among children and young people (aged <20 years) where investments are most important for long-term human development is particularly concerning in Uganda (3 per cent), Mozambique (9 per cent), and Tanzania (10 per cent). The high share of children covered in Ghana and Zambia is due to the large number of children covered by the school meals programmes, which also indirectly benefit other (older) household members.

Relatedly, Tables A2–A6 provide coverage rates for additional population subgroups, showing that in Ghana, Tanzania, and Zambia (and to a lesser extent in Mozambique), benefit coverage increases with the number of children in the household. In Uganda, coverage decreases with the number of children, reflecting the absence of any social protection that is explicitly targeted at low-income households with children. Other notable differences between coverage rates exist between formal and informal workers in all five countries. Informal workers are more likely than formal workers to be covered by social protection programmes. There are no large differences in coverage by gender, but in Zambia female-headed households had a much higher coverage rate (70.5 per cent) than male-headed households (48.7 per cent) due to the design of the Social Cash Transfer that is targeted at female-headed households (among other groups).

To further understand the role of benefits to support incomes and consumption, we look at how effective benefits are in lifting recipients out of poverty (the poverty headcount) or closer to the poverty line (the

Figure 1: Benefit coverage as a percentage of the population by income/consumption quintile group
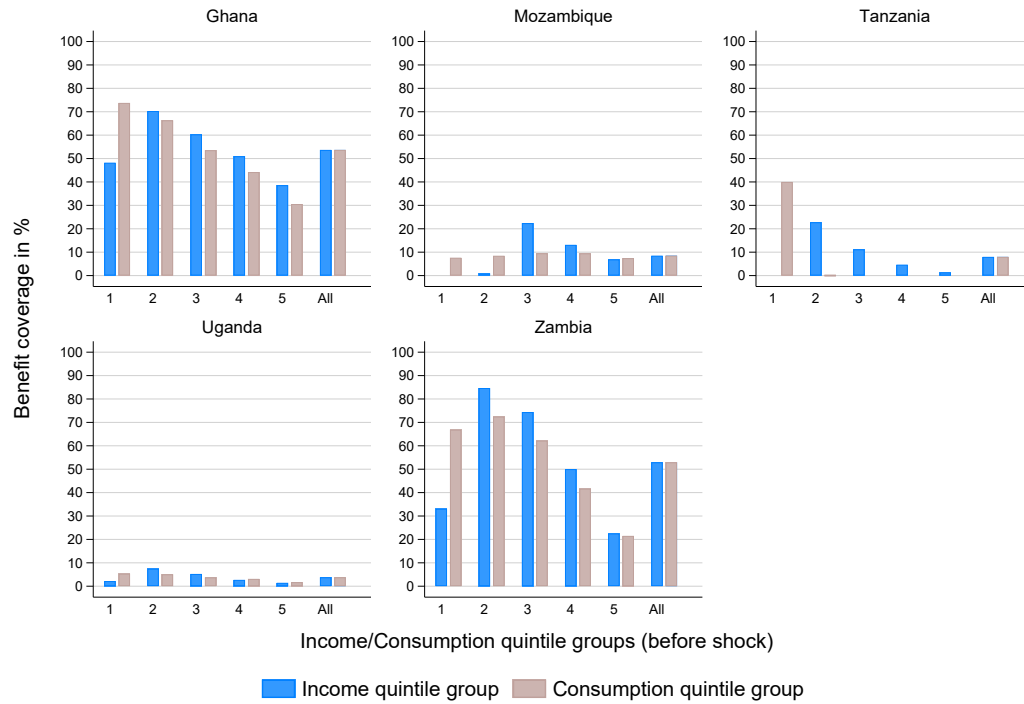
Note: the figure shows benefit coverage for the total population and by quintile groups of equivalized household net income/consumption in the baseline. Benefit coverage is the number of individuals living in households in receipt of social protection benefits, as a proportion of the total population/population in the respective quintile group.

Source: authors' calculations.

Figure 2: Benefit coverage as a percentage of the population by age group
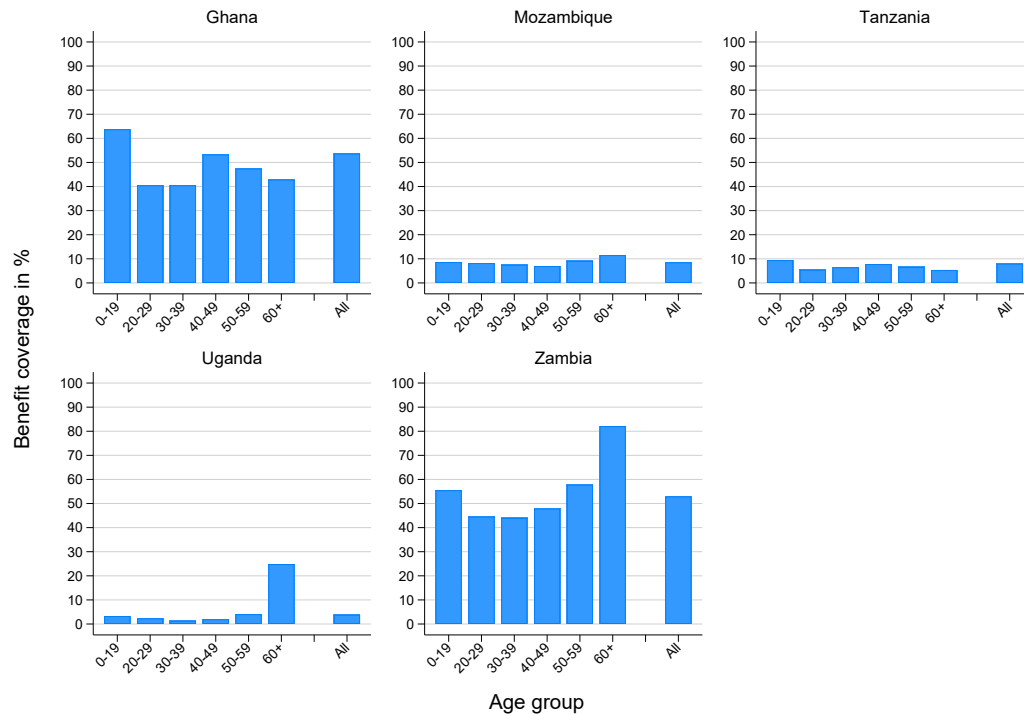
Note: the figure shows benefit coverage by age group in the baseline. Note that age groups are those of individuals but benefits are still those of the household in which individuals live.

Source: authors' calculations.

poverty gap). We look at estimates of income poverty—as a key measure of household resources and for assessing the distributional role of the social protection system—as well as consumption poverty—which is the standard measure of poverty used in LICs and LMICs.

Table 4 shows the income poverty rate and poverty gap using different income definitions (pre- and post-benefit receipt) and the effectiveness of benefits in reducing poverty. The income poverty headcount using household net incomes (column 'Total') in normal times is highest in Mozambique (83.5 per cent), followed by Uganda (72.4 per cent), Zambia (71.8 per cent) and Tanzania (70.3 per cent), and is significantly lower in Ghana (44.8 per cent). Strikingly, the impact of the combined receipt of benefits on the income poverty headcount (column 'B') is low across all countries: without the receipt of benefits, poverty in Ghana would be 2.3 percentage points (pp) higher, compared to 1 pp higher in Zambia and 0.4 pp in Mozambique. The impact of benefits on poverty is (close to) zero in Tanzania and Uganda. Social protection programmes are somewhat more effective in lowering the poverty gap, but the impact is still small. The income poverty gap increases most in Zambia with the removal of benefits (by 4.8 pp or 9.3 per cent), followed by Ghana (3.9 pp or 13.2 per cent). The impact is less than 1 pp in the other three countries.

Table 5 repeats the above analysis for poverty using consumption. Estimates of consumption poverty are substantially lower than of income poverty, reflecting the importance of inter-household in-kind transfers (see e.g. Gasior et al. 2021a). Except for Ghana, with a poverty headcount of 17.3 per cent, poverty estimates for all other countries are higher than the rate of 38.33 per cent for Sub-Saharan Africa.[13] Uganda has the highest poverty rate, estimated at 65.3 per cent, followed by Mozambique (56.7 per cent), Zambia (54.3 per cent), and Tanzania (44.3 per cent). Consistent with the results for income, the impact of social protection on consumption poverty is smallest in Tanzania and Uganda, and greatest in Ghana and Zambia. The relative reduction in poverty is bigger for consumption than for income measures. But except for Ghana, where benefits have a somewhat sizeable effect on consumption poverty, reducing the headcount by 2.5 pp (14.5 per cent) and gap by 1.6 pp (26.7 per cent), benefits in the other countries have overall limited impact on poverty.

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[13] Our World in Data, Share of population living in extreme poverty: 2011 vs. 2017 prices, 1987 to 2019: https://ourworldindata.org/from-1-90-to-2-15-a-day-the-updated-international-poverty-line.

Table 4: Income poverty rates in the baseline

	Levels (%)					Δ (% points) due to			
	Total	Pre-B	Pre-NMTB	Pre-MTB	Pre-P	B	NMTB	MTB	P
A. Poverty headcount									
Ghana	44.8***	47.1***	46.6***	44.8***	45.3***	−2.3***	−1.8***	−0.0	−0.5***
	(0.598)	(0.601)	(0.599)	(0.598)	(0.601)	(0.157)	(0.136)	(0.001)	(0.067)
Mozambique	83.5***	84.0***	83.5***	83.6***	84.0***	−0.4***	0.0	−0.0**	−0.4***
	(0.285)	(0.287)	(0.285)	(0.285)	(0.287)	(0.047)	(0.000)	(0.008)	(0.046)
Tanzania	70.3***	70.4***	70.3***	70.4***	70.3***	−0.1	0.0	−0.1	.0
	(0.644)	(0.644)	(0.644)	(0.644)	(0.644)	(0.037)	(0.000)	(0.037)	(0.000)
Uganda	72.4***	72.4***	72.4***	72.4***	72.4***	−0.0***	−0.0***	0.0	.0
	(0.565)	(0.564)	(0.564)	(0.565)	(0.565)	(0.012)	(0.012)	(0.000)	(0.000)
Zambia	71.8***	72.8***	72.3***	72.1***	71.9***	−1.0***	−0.5***	−0.3***	−0.1**
	(0.586)	(0.588)	(0.592)	(0.588)	(0.586)	(0.108)	(0.081)	(0.064)	(0.030)
B. Poverty gap									
Ghana	29.6***	33.5***	33.1***	29.7***	30.0***	−3.9***	−3.4***	−0.1***	−0.3***
	(0.478)	(0.513)	(0.510)	(0.479)	(0.479)	(0.114)	(0.097)	(0.007)	(0.049)
Mozambique	68.5***	69.6***	68.5***	69.1***	69.0***	−1.1***	0.0	−0.6***	−0.5***
	(0.319)	(0.320)	(0.319)	(0.320)	(0.319)	(0.043)	(0.000)	(0.021)	(0.038)
Tanzania	53.2***	53.6***	53.2***	53.6***	53.2***	−0.5***	0.0	−0.5***	.0
	(0.569)	(0.573)	(0.569)	(0.573)	(0.569)	(0.021)	(0.000)	(0.021)	(0.000)
Uganda	49.5***	49.8***	49.8***	49.5***	49.5***	−0.3***	−0.3***	0.0	.0
	(0.457)	(0.458)	(0.458)	(0.457)	(0.457)	(0.015)	(0.015)	(0.000)	(0.000)
Zambia	51.6***	56.5***	54.2***	53.7***	51.7***	−4.8***	−2.6***	−2.1***	−0.1***
	(0.498)	(0.520)	(0.514)	(0.501)	(0.500)	(0.082)	(0.053)	(0.051)	(0.026)

Note: the poverty line equals US$1.9 per day (2011 PPP). The poverty headcount is the proportion (%) of the population living below the poverty line. The poverty gap is the mean shortfall of the total population from the poverty line (with the non-poor having a zero shortfall), as a percentage of the poverty line. Equivalized household incomes using per-capita equivalence scale and adjusted for PPP per US$. Total = total net incomes. B = all benefits (NMTB + MTB + P). NMTB = non-means-tested benefits. MTB = means-tested benefits. P = social insurance pensions. For example, Pre-All-B refers to the poverty estimates based on incomes before adding all benefits; Δ due to B indicates the reduction to poverty due to all benefits (i.e. the difference in poverty based on Total versus Pre-B incomes). Standard errors at a confidence level of 95 per cent are shown in parentheses. Bootstrapped standard errors after 200 replications. Significance levels indicated as * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: authors' calculations.

Table 5: Consumption poverty rates in the baseline

	Levels (%)					Δ (% points) due to			
	Total	Pre-B	Pre-NMTB	Pre-MTB	Pre-P	B	NMTB	MTB	P
A. Poverty headcount									
Ghana	17.3***	19.8***	19.5***	17.3***	17.6***	−2.5***	−2.2***	0.0	−0.3***
	(0.463)	(0.497)	(0.493)	(0.463)	(0.468)	(0.201)	(0.192)	(0.000)	(0.051)
Mozambique	56.7***	57.5***	56.7***	57.1***	57.1***	−0.8***	0.0	−0.4***	−0.4***
	(0.488)	(0.477)	(0.488)	(0.481)	(0.486)	(0.071)	(0.000)	(0.053)	(0.051)
Tanzania	44.3***	44.3***	44.3***	44.3***	44.3***	0.0	0.0	0.0	0.0
	(0.629)	(0.629)	(0.629)	(0.629)	(0.629)	(0.000)	(0.000)	(0.000)	(0.000)
Uganda	65.3***	65.5***	65.5***	65.3***	65.3***	−0.2***	−0.2***	0.0	0.0
	(0.576)	(0.576)	(0.576)	(0.576)	(0.576)	(0.040)	(0.040)	(0.000)	(0.000)
Zambia	54.3***	56.6***	55.6***	55.2***	54.3***	−2.3***	−1.3***	−0.9***	−0.1*
	(0.659)	(0.646)	(0.644)	(0.655)	(0.655)	(0.162)	(0.130)	(0.098)	(0.031)
B. Poverty gap									
Ghana	6.0***	7.6***	7.3***	6.1***	6.2***	−1.6***	−1.3***	−0.1***	−0.2***
	(0.181)	(0.203)	(0.196)	(0.184)	(0.185)	(0.059)	(0.042)	(0.007)	(0.037)
Mozambique	22.6***	23.4***	22.6***	23.0***	23.0***	−0.8***	0.0	−0.4***	−0.4***
	(0.261)	(0.264)	(0.261)	(0.263)	(0.262)	(0.035)	(0.000)	(0.018)	(0.031)
Tanzania	13.1***	13.6***	13.1***	13.6***	13.1***	−0.5***	0.0	−0.5***	0.0
	(0.251)	(0.265)	(0.251)	(0.265)	(0.251)	(0.023)	(0.000)	(0.023)	(0.000)
Uganda	27.8***	28.1***	28.1***	27.8***	27.8***	−0.3***	−0.3***	0.0	0.0
	(0.305)	(0.306)	(0.306)	(0.305)	(0.305)	(0.014)	(0.014)	(0.000)	(0.000)
Zambia	26.3***	30.1***	28.4***	28.0***	26.3***	−3.8***	−2.1***	−1.7***	−0.0***
	(0.406)	(0.433)	(0.424)	(0.415)	(0.406)	(0.067)	(0.047)	(0.045)	(0.013)

Note: see Table 4. Equivalized household consumption using per-capita equivalence scale and adjusted for PPP per US$. MPC assumed to be 1. Total = total consumption. For example, Pre-B refers to the poverty estimates based on consumption before accounting for receipt of all benefits; Δ due to B indicates the reduction to poverty due to all benefits (i.e. the difference in poverty based on Total versus Pre-B consumption).

Source: authors' calculations.

5.2 The role of benefit automatic stabilizers during a crisis

To assess the extent to which benefit AS cushion negative shocks, we simulate (1) an employment shock by transitioning individuals out of employment, so aggregate earnings fall by 10 per cent; and (2) an earnings shock by reducing individuals' earnings by 10 per cent. For each of the scenarios, Figure 3 shows how net incomes are affected by the shock. The total change in mean household net income/consumption (black circle) is estimated for the whole population and by quintile of baseline, pre-shock net income. The total change is broken down by income source (the bars add up to the black circle) to show the separate contribution of changes to: gross (pre-tax) market incomes (i.e. earnings), means-tested benefits, non-means-tested benefits, social insurance pensions, income tax, and SIC.

Figure 3 shows that across countries, household net income on average falls by about 8 per cent as a result of the employment/earnings shock. But countries differ by how different income groups are affected by the shocks, reflecting differences in the number and distribution of earners across quintile groups. The reduction in net income is broadly increasing with quintile group in Ghana and Zambia, while no losses are observed in the bottom 20 per cent in Mozambique due to a concentration of households with zero baseline income. Losses are more equally spread across the distribution in Tanzania and Uganda. Breaking down the change in net income by source shows that the losses to gross market incomes are not mitigated by benefits. In other words, social protection programmes as currently designed lack in-built flexibility and so fail to respond to the loss in earnings and employment. On the other hand, mostly for the richest 20–40 per cent of households, some of the losses to gross market incomes are mitigated by automatic reductions in income tax liabilities and SIC. Thus, while social protection benefits fail to respond to the negative shocks, income taxes and SIC do so by benefiting households in the upper part of the distribution.

Figure 3: Impact of a shock on mean net income by income quintile

A. Employment shock

quintile groups based on net income (before shock)

Legend:
- ● Net income
- □ Income tax
- ■ Social insurance pensions
- ■ Non-means-tested benefits
- □ Gross (pre-tax) market income
- ■ SIC
- ■ Means-tested benefits
- □ 95% CI

B. Earnings shock

quintile groups based on net income (before shock)

Legend:
- ● Net income
- □ Income tax
- ■ Social insurance pensions
- ■ Non-means-tested benefits
- □ Gross (pre-tax) market income
- ■ SIC
- ■ Means-tested benefits
- □ 95% CI
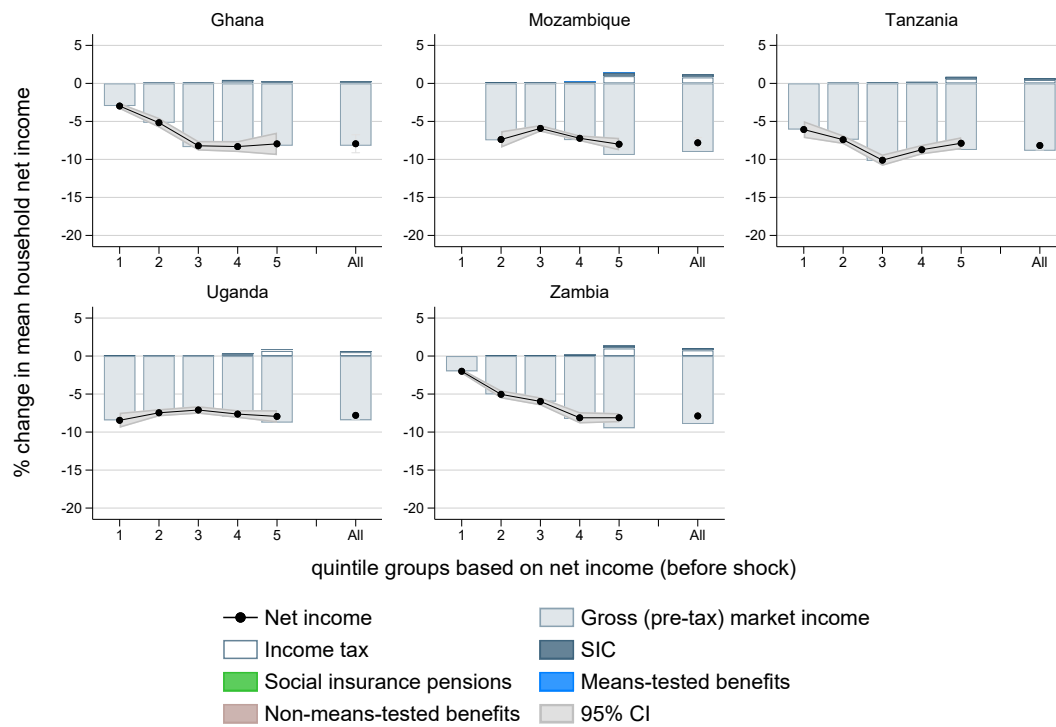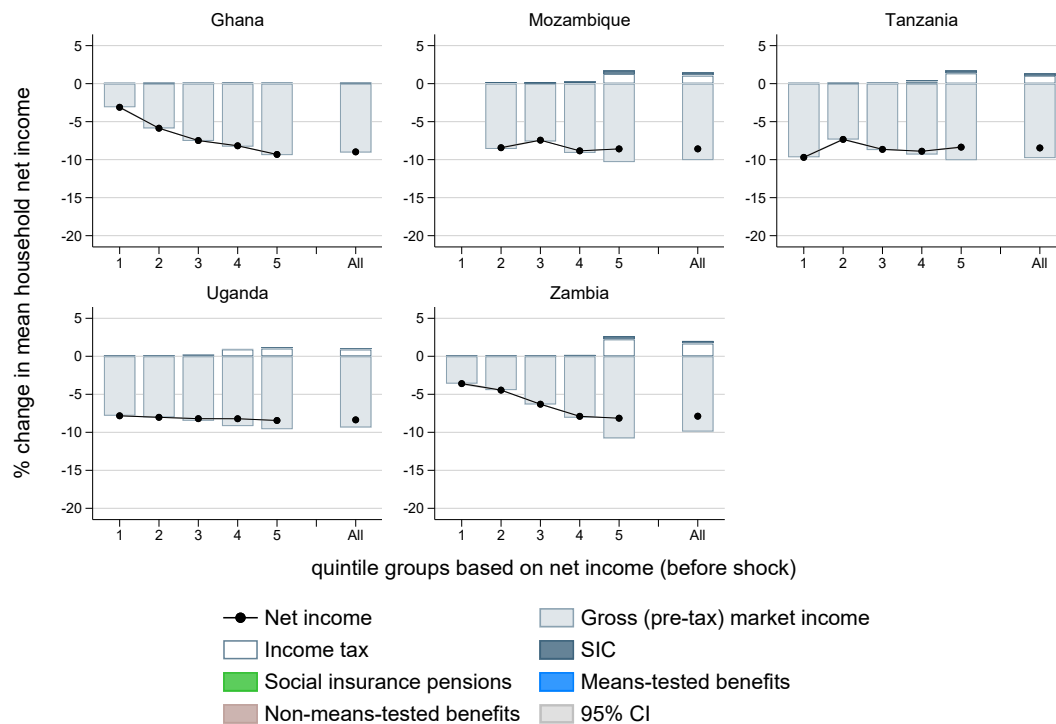
Note: the figure shows the distributional impact of the shock. Changes in income based on equivalized household net income.

Source: authors' calculations.

The lack of/limited expansion in benefit coverage between the baseline (normal times) and the employment and earnings shock is also illustrated in Table 6. Only Mozambique shows a tiny increase (0.1

per cent) in coverage due to a small increase in the number of eligible households for the Basic Social Subsidy Programme.

Table 6: Benefit coverage (% population) in the baseline and impact of a shock

	Baseline	Impact of a shock (% points)	
	(%)	Employment shock	Earnings shock
Ghana	53.7	0.0	0.0
Mozambique	8.5	0.1	0.1
Tanzania	8.0	0.0	0.0
Uganda	3.8	0.0	0.0
Zambia	53.0	0.0	0.0

Note: benefit coverage is the share of individuals living in households in receipt of social protection benefits—in the baseline and the change to coverage, in percentage points relative to baseline, as a result of a shock.

Source: authors' calculations.

Next, we estimate net replacement rates (NRRs), defined as the ratio between the average household net income after and before the shock. NRRs tell us how much of the baseline income is kept after the employment/earnings shock and to what extent income losses are being cushioned by benefits versus other income sources of the household. A low NRR means limited cushioning of the income loss. Figure 4 shows NRRs (black circle) by quintile of baseline income and for the whole population, broken down by income source (bars add up to circle). On average for the whole population and both types of shock, NRRs are nearly identical across countries, at 91–92 per cent. Breaking down NRRs by income source shows the large contribution of gross (pre-tax) income—that is, the earnings of other household members as well as other types of market income. Benefits on average play a small role in protecting household incomes against shocks, accounting for: 4.6 per cent of baseline income in Zambia, with almost equal contribution by means-tested and non-means-tested benefits; 3.6 per cent in Mozambique due to social insurance pensions; 2.4 per cent in Ghana due to non-means-tested benefits; and less than 0.5 per cent in Tanzania and Uganda.

In Ghana and Zambia the higher benefit coverage in 'normal' times means that many households at the bottom of the income distribution are protected by an income floor. For the poorest 20 per cent of the population, benefits replace on average 61 and 66 per cent of baseline income in Ghana and Zambia, respectively. Benefits provide some income protection also in quintiles 2 and 3. But this is not the case in Mozambique, Tanzania, and Uganda, where social protection is vastly more limited. In Mozambique and Tanzania, means-tested benefits provide some support for the second and third quintile, respectively; while pensions in Mozambique help protect the incomes of those in the richest income quintile. In Uganda, households almost exclusively rely on the household gross (pre-tax) income as an intra-household coping strategy.

Finally, we look at the impact of crisis and benefits on poverty. Tables 7 and 8 present income and consumption poverty rates, respectively, in the baseline (columns 2–4) and the percentage point change in the poverty rates due to the shocks (columns 5–10). The poverty headcount and gap using income/consumption before benefit receipt ('pre-B') and after benefit receipt ('Total') increase by a similar amount due to the employment and earnings shocks. That means benefits fail to mitigate the increase in poverty due to crises. This is due to the limited expansion in the number of benefit recipients and amounts.

Across countries, the benefits in place largely focus on people in chronic poverty and are designed to target vulnerable groups based on long-term household characteristics. Those in employment who are often better off than others in the population are less likely to be targeted in normal times and cannot rely on a state-provided safety net in times of crisis. This increases the risk of them not only becoming transitory poor in the short term but becoming chronically poor if the shock lasts longer and those being hit by the crisis cannot find new employment.

Figure 4: Net replacement rates by income quintile group

A. Employment shock

Net income ●——
Income tax ▢
Social insurance pensions ▣
Non-means-tested benefits ▣

Gross (pre-tax) market income ▢
SIC ▣
Means-tested benefits ▣
95% CI ▢

B. Earnings shock

Net income ●——
Income tax ▢
Social insurance pensions ▣
Non-means-tested benefits ▣

Gross (pre-tax) market income ▢
SIC ▣
Means-tested benefits ▣
95% CI ▢
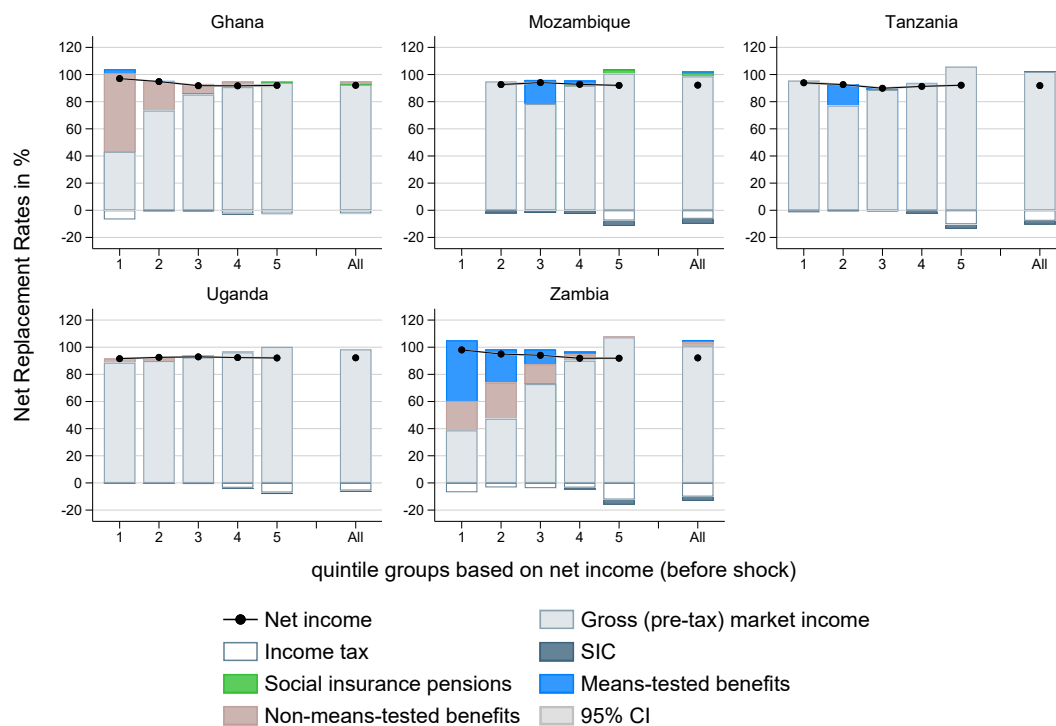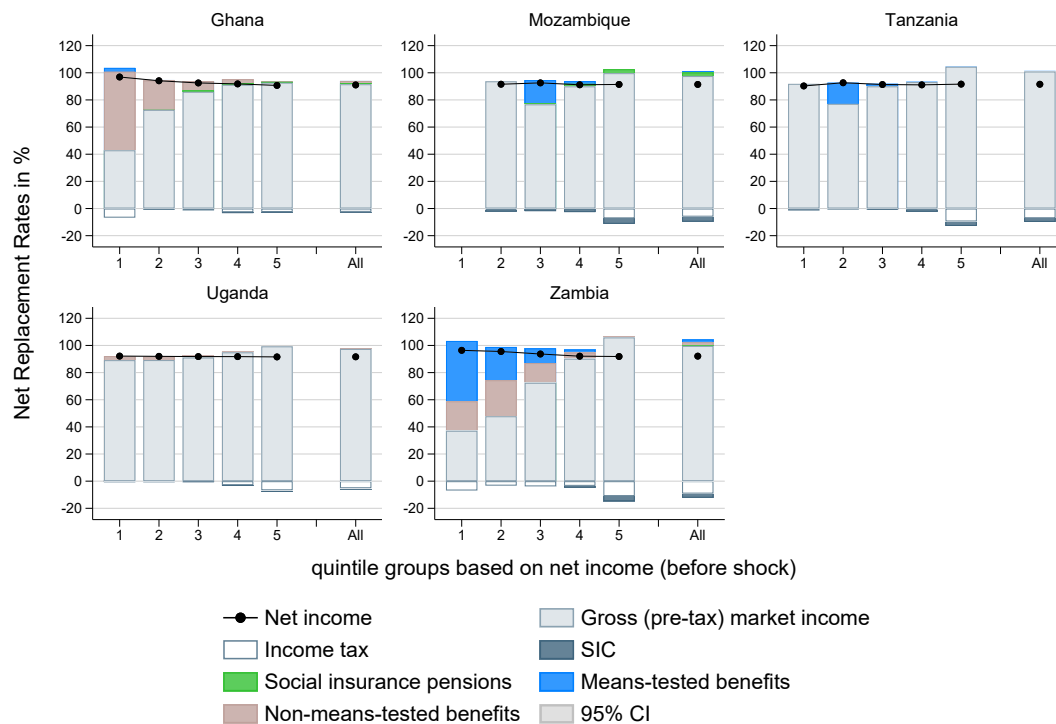
Note: the figure shows NRR (i.e. the ratio between the average household net income after and before the shock, broken down by income source). Results are based on equivalized household incomes.

Source: authors' calculations.

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Table 7: Income poverty rates in the baseline and the impact of a shock

	Baseline (%)			Impact of a shock: change (% points) to baseline					
				Employment shock			Earnings shock		
	Total	Pre-B	Δ B	Total	Pre-B	Δ B	Total	Pre-B	Δ B
A. Poverty headcount									
Ghana	44.8***	47.1***	−2.3***	4.5***	4.4***	0.1**	1.7***	1.6***	0.1
	(0.598)	(0.601)	(0.157)	(0.318)	(0.322)	(0.057)	(0.136)	(0.159)	(0.159)
Mozambique	83.5***	84.0***	−0.4***	1.2***	1.2***	−0.0**	1.5***	1.5***	0.0*
	(0.285)	(0.287)	(0.047)	(0.071)	(0.073)	(0.011)	(0.091)	(0.092)	(0.018)
Tanzania	70.3***	70.4***	−0.1	2.4***	2.4***	0.0	2.0***	2.0***	0.0
	(0.644)	(0.644)	(0.037)	(0.210)	(0.210)	(0.000)	(0.209)	(0.210)	(0.047)
Uganda	72.4***	72.4***	−0.0***	2.1***	2.1***	0.0	2.0***	2.0***	0.0
	(0.565)	(0.564)	(0.012)	(0.160)	(0.160)	(0.002)	(0.192)	(0.191)	(0.013)
Zambia	71.8***	72.8***	−1.0***	2.3***	2.2***	0.1**	1.5***	1.5***	−0.0
	(0.586)	(0.588)	(0.108)	(0.195)	(0.190)	(0.028)	(0.181)	(0.191)	(0.108)
B. Poverty gap									
Ghana	29.6***	33.5***	−3.9***	4.2***	4.5***	−0.3***	1.0***	1.1***	−0.1***
	(0.478)	(0.513)	(0.114)	(0.256)	(0.266)	(0.033)	(0.026)	(0.029)	(0.012)
Mozambique	68.5***	69.6***	−1.1***	1.9***	1.9***	−0.0***	1.4***	1.4***	−0.0***
	(0.319)	(0.320)	(0.043)	(0.083)	(0.083)	(0.004)	(0.021)	(0.021)	(0.003)
Tanzania	53.2***	53.6***	−0.5***	3.2***	3.2***	−0.0**	1.6***	1.6***	−0.0*
	(0.569)	(0.573)	(0.021)	(0.186)	(0.187)	(0.002)	(0.035)	(0.035)	(0.001)
Uganda	49.5***	49.8***	−0.3***	3.2***	3.3***	−0.0*	2.0***	2.0***	−0.0***
	(0.457)	(0.458)	(0.015)	(0.152)	(0.153)	(0.001)	(0.031)	(0.031)	(0.001)
Zambia	51.6***	56.5***	−4.8***	2.9***	2.9***	−0.0***	1.4***	1.4***	−0.1***
	(0.498)	(0.520)	(0.082)	(0.197)	(0.197)	(0.009)	(0.035)	(0.034)	(0.006)

Note: see Table 4.

Source: authors' calculations.

Table 8: Consumption poverty rates in the baseline and the impact of a shock

	Baseline (%)			Impact of a shock: change (% points) to baseline					
				Employment shock			Earnings shock		
	Total	Pre-B	Δ B	Total	Pre-B	Δ B	Total	Pre-B	Δ B
A. Poverty headcount									
Ghana	17.3***	19.8***	−2.5***	3.6***	3.7***	−0.1	4.9***	4.8***	0.1
	(0.463)	(0.497)	(0.201)	(0.263)	(0.292)	(0.138)	(0.245)	(0.255)	(0.164)
Mozambique	56.7***	57.5***	−0.8***	1.4***	1.4***	0.1**	2.2***	2.2***	−0.0
	(0.488)	(0.477)	(0.071)	(0.089)	(0.084)	(0.023)	(0.127)	(0.122)	(0.042)
Tanzania	44.3***	44.3***	0.0	2.9***	2.9***	0.0	3.8***	3.8***	.0
	(0.629)	(0.629)	(0.000)	(0.232)	(0.232)	(0.000)	(0.248)	(0.248)	(0.000)
Uganda	65.3***	65.5***	−0.2***	2.5***	2.5***	0.0	4.5***	4.4***	0.0
	(0.576)	(0.576)	(0.040)	(0.183)	(0.185)	(0.018)	(0.263)	(0.264)	(0.038)
Zambia	54.3***	56.6***	−2.3***	2.2***	2.1***	0.0	1.9***	2.1***	-.2
	(0.659)	(0.646)	(0.162)	(0.199)	(0.194)	(0.065)	(0.198)	(0.226)	(0.155)
B. Poverty gap									
Ghana	6.0***	7.6***	−1.6***	3.2***	3.3***	−0.1***	2.9***	3.2***	−0.3***
	(0.181)	(0.203)	(0.059)	(0.244)	(0.245)	(0.018)	(0.191)	(0.195)	(0.029)
Mozambique	22.6***	23.4***	−0.8***	1.4***	1.4***	−0.0***	1.3***	1.4***	−0.0***
	(0.261)	(0.264)	(0.035)	(0.065)	(0.065)	(0.005)	(0.035)	(0.035)	(0.004)
Tanzania	13.1***	13.6***	−0.5***	2.9***	2.9***	0.0***	2.2***	2.2***	0.0
	(0.251)	(0.265)	(0.023)	(0.175)	(0.174)	(0.003)	(0.073)	(0.073)	(0.001)
Uganda	27.8***	28.1***	−0.3***	3.0***	3.0***	−0.0	3.4***	3.4***	−0.0***
	(0.305)	(0.306)	(0.014)	(0.142)	(0.142)	(0.002)	(0.092)	(0.092)	(0.002)
Zambia	26.3***	30.1***	−3.8***	2.4***	2.4***	0.0	1.5***	1.6***	−0.1***
	(0.406)	(0.433)	(0.067)	(0.162)	(0.161)	(0.011)	(0.059)	(0.060)	(0.009)

Note: see Table 5.

Source: authors' calculations.

6   Conclusions

This paper examines the social protection arrangements in five Sub-Saharan African countries. We have demonstrated that although coverage is fairly high in Ghana and Zambia, the poverty-reducing impact of social protection in all five countries is limited. The small impact on poverty means that the benefits are paid at too low a level to bring households out of poverty using the selected poverty line. Our results highlight the different starting points for improving social protection in the five countries, ranging from better targeting and higher levels of support in countries with already high coverage (Ghana and Zambia) to social protection systems with vastly more limited coverage (Mozambique, Tanzania, and especially Uganda). This is also in line with previous research on single countries showing, for example, that a sizeable share of those living in poverty does not receive support in Zambia (Gasior et al. 2021b) or that the low level of social spending in Uganda leads to a disproportionately higher share of net payers into the system than net recipients from the system (Jellema et al. 2017).

By simulating employment and earnings shocks, we show that the effectiveness of benefits to stabilize incomes and consumption is limited. This chimes with previous research on Ghana showing the lack of automatic stabilization from existing benefits (Adu-Ababio 2022). As currently designed, benefits in the five countries are not responsive to sudden changes in incomes and employment, either (for positive reasons) because the benefits are universal, or (problematically) because they rely on inflexible proxy means tests and tight eligibility criteria.

Notwithstanding this overarching point, there is a subtler point to be made regarding the apparent inflexibility of the social insurance schemes. Four of the five countries do not have unemployment insurance and so the fact that people do not transition into social insurance receipt accurately reflects the policy arrangements. However, in the case of Tanzania there is unemployment insurance—the National Social Security Fund for formal workers and self-employed people, and the Public Service Social Security Fund for people working in the public sector—but transitions into social insurance are not simulated in our analysis as part of the shock and so the results will overstate the inflexibility of the social protection arrangements. Nevertheless, coverage of the various schemes is very low and fragmented, suggesting that the poverty impact is similarly low for the majority of the population.

The limited flexibility within the existing arrangements does not necessarily mean that the system cannot respond quickly to a crisis. For example, a government may opt to temporarily increase payments made to existing beneficiaries, increase the number of households eligible to receive a grant by some mechanism other than a means test, or introduce a wholly new type of social protection in the face of a crisis. But this brings with it fresh challenges as set out in Section 2. Policy responses to the COVID-19 pandemic provide examples of how policy-makers may introduce new forms of support or may vertically and horizontally increase existing support during times of crisis. However, all options require there to be functioning administrative systems in place to be able to deliver the additional support to those in need. The pandemic has furthermore revealed how a policy response in other policy dimensions can lead to adverse effects in social policy, especially when support is provided through in-kind rather than cash benefits. School closures—health-related measures—in Ghana and Zambia led to the pausing of the school feeding programmes in the two countries, putting additional pressure on vulnerable households with school-age children (Lastunen et al. 2021).

Our findings highlight the importance of being able to interrogate the social protection arrangements in a country to estimate their impact on income and consumption poverty, and for different subgroups. Without such information, it is difficult to defend the existence of social protection at an aggregate level, and to substantiate calls for its expansion.

We encountered a number of methodological challenges during the course of the analysis. First, it was not possible to estimate the quality of the income data, which is used much less than the consumption data in these countries. Second, comparisons between countries depend not only on comparable concepts but also on comparable capture of the social protection policies in place in each country: the inclusion of in-kind benefits has not been exhaustively achieved across the SOUTHMOD models (nor have the types of in-kind support to be captured been explicitly defined). Until the definition and simulation of in-kind support has been harmonized across the SOUTHMOD models, it is possible that some of the observed cross-country differences relating to social protection coverage may simply reflect this issue.

We undertook the analysis using a time point just prior to the onset of the COVID-19 pandemic, and the subsequent war between Russia and Ukraine, both of which created economic shocks that affected countries across the world. Tax–benefit microsimulation is a valuable tool for exploring the impact not only of hypothetical shocks but also of real-time shocks as they occur. Cross-country analysis helps shed light on how the arrangements in different countries perform in protecting low-income households from such shocks, and can help to facilitate cross-country policy learning.

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Supplementary materials

A1   Tables

Table A1: Overview of included tax-benefit policies

Name	Type	Target group	Income test (benefit)/contribution (taxes and SIC)
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 capitation grant	Free school meals	Children attending a public primary school	Not means tested
Free Senior High School policy	Cash benefit	Students in a public senior high school	Not means tested
Old-age pension	Social-security programme	Old-age pensioners	Not means tested
Personal income tax	Direct tax	Individuals with an annual income from main employment and work or enterprise above 3,456 are liable	Rates for incomes above 3,456 start at 5 percent 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 percent
Employee SIC for pension and health	SIC	Employees and entrepreneurs in the formal sector	Flat rate of 3 and 2.5%
MOZAMBIQUE			
Basic social subsidy programme (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	A two-stage means test is applied first at the level of the individual and then at the level of the household
Old-age pension (Pensão de reforma)	Social-security programme	Old-age pensioners	Not means tested
Survivors' pension (Pensão de sangue (viuvez))	Social-security programme	Survivors and widows	Not means tested
Personal income tax	Direct tax	Individuals with employment income above 20,249 per month are liable	Rates for incomes above 20,249 start at 10 percent 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%

Name	Type	Target group	Income test (benefit)/contribution (taxes and SIC)
Other personal income tax	Direct tax	Individuals with other personal income above 225,000 per year are liable	Rates 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
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	Yes and no, the standard criterion is that it is for households below 33,748 per adult equivalent per month but this is achieved via a selection process involving a Village Assembly and a proxy-means test
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	Rates for incomes above 2.040 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	Rates 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.	Not means tested
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.	Rates for incomes above 820,000 start at 10% and go up to 40%

Name	Type	Target group	Income test (benefit)/contribution (taxes and SIC)
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
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 payment	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	School fees	Girls of secondary school-age living in Social Cash Transfer households	Proxy-means test
Home Grown School Meal Programme	Free school meals for students	Students attending a public school in an eligible district	Not means tested
Electronic-Farmer Input Support Programme	VISA card to buy inputs	Small-scale farmers (graduating from FSP) who are a member of a registered farmer organization; have the capacity to pay the farmer contribution and who are cultivating land between 0.5 to 5 hectare	Not means tested
Food Security Pack	Input grant	Vulnerable and small-scale 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
Old-age pension	Social-security programme	Old-age individuals	Not means tested
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	Rates 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%

Name	Type	Target group	Income test (benefit)/contribution (taxes and SIC)
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: authors' representation based on SOUTHMOD country reports (Adu-Ababio 2022; Castelo et al. 2022; Kalikeka et al. 2022; Leyaro et al. 2022; Waiswa et al. 2022).

Table A2: Benefit coverage (% of population) in the baseline and impact of shocks: Ghana

| | Baseline | | | | Δ relative to baseline after shock to: | | | | | | | |
| | | | | | Earnings | | | | Employment | | | |
	B	NMTB	MTB	P	B	NMTB	MTB	P	B	NMTB	MTB	P
All	53.7	52.5	.8	1.4	.0	.0	.0	.0	.0	.0	.0	.0
Age group:												
< 20	63.8	63.1	1.0	.8	.0	.0	.0	.0	.0	.0	.0	.0
20-29	40.6	39.3	.4	1.6	.0	.0	.0	.0	.0	.0	.0	.0
30-39	40.5	39.7	.6	.8	.0	.0	.0	.0	.0	.0	.0	.0
40-49	53.3	52.7	.5	.8	.0	.0	.0	.0	.0	.0	.0	.0
50-59	47.5	46.0	.6	1.7	.0	.0	.0	.0	.0	.0	.0	.0
60+	42.9	36.8	1.5	7.3	.0	.0	.0	.0	.0	.0	.0	.0
Women	54.5	53.4	.8	1.4	.0	.0	.0	.0	.0	.0	.0	.0
Men	52.8	51.6	.8	1.5	.0	.0	.0	.0	.0	.0	.0	.0
Women in (self-)employment:												
formal	27.7	25.2	.0	4.2	.0	.0	.0	.0	.0	.0	.0	.0
informal	40.4	39.8	.3	.8	.0	.0	.0	.0	.0	.0	.0	.0
Men in (self-)employment:												
formal	29.9	28.3	.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
informal	34.6	33.8	.2	1.1	.0	.0	.0	.0	.0	.0	.0	.0
Household type:												
Female-headed hhs	51.0	50.2	.5	1.2	.0	.0	.0	.0	.0	.0	.0	.0
Male-headed hhs	54.8	53.4	.9	1.5	.0	.0	.0	.0	.0	.0	.0	.0
Children in the household:												
0	9.8	5.9	.1	3.9	.0	.0	.0	.0	.0	.0	.0	.0
1-2	41.1	40.0	.4	1.8	.0	.0	.0	.0	.0	.0	.0	.0
3+	73.8	73.3	1.3	.5	.0	.0	.0	.0	.0	.0	.0	.0
With income from:												
employment	46.9	45.8	.2	1.8	.0	.0	.0	.0	.0	.0	.0	.0
self-employment	56.5	55.7	.3	1.1	.0	.0	.0	.0	.0	.0	.0	.0
agriculture	67.9	67.0	1.0	.7	.0	.0	.0	.0	.0	.0	.0	.0

Note: table shows the proportion of the population receiving benefits, in the baseline (columns 2–5) and the change to coverage, in % points relative to baseline, as a result of a shock (columns 6–13). Benefit coverage based on equivalized household incomes using per-capita equivalence scale. B = all benefits (NMTB + MTB + P). NMTB = non-means-tested benefits. MTB = means-tested benefits. P = pensions. Note that some groups such as by age or gender are that of individuals but benefits are still those of the household in which individuals live in.

Source: authors' calculations.

Table A3: Benefit coverage (% of population) in the baseline and impact of shocks: Mozambique

| | Baseline | | | | Δ relative to baseline after shock to: | | | | | | | |
| | | | | | Earnings | | | | Employment | | | |
	B	NMTB	MTB	P	B	NMTB	MTB	P	B	NMTB	MTB	P
All	8.5	.0	6.6	2.0	.1	.0	.1	.0	.1	.0	.1	.0
Age group:												
< 20	8.7	.0	7.1	1.7	.1	.0	.1	.0	.1	.0	.1	.0
20-29	8.2	.0	6.2	2.1	.1	.0	.1	.0	.1	.0	.1	.0
30-39	7.5	.0	6.4	1.2	.1	.0	.1	.0	.1	.0	.1	.0
40-49	7.0	.0	5.5	1.6	.1	.0	.1	.0	.1	.0	.1	.0
50-59	9.2	.0	6.0	3.2	.1	.0	.1	.0	.1	.0	.1	.0
60+	11.6	.0	5.8	6.1	.0	.0	.0	.0	.0	.0	.0	.0
Women	8.3	.0	6.5	2.0	.1	.0	.1	.0	.1	.0	.1	.0
Men	8.7	.0	6.8	2.0	.1	.0	.1	.0	.1	.0	.1	.0
Women in (self-)employment:												
formal	6.8	.0	2.2	4.6	.2	.0	.2	.0	.3	.0	.3	.0
informal	7.9	.0	4.9	3.1	.2	.0	.2	.0	.4	.0	.4	.0
Men in (self-)employment:												
formal	5.7	.0	3.2	2.6	.3	.0	.3	.0	.2	.0	.3	.0
informal	7.5	.0	5.4	2.2	.1	.0	.1	.0	.2	.0	.2	.0
Household type:												
Female-headed hhs	8.6	.0	6.6	2.2	.0	.0	.0	.0	.1	.0	.1	.0
Male-headed hhs	8.5	.0	6.7	1.9	.1	.0	.1	.0	.1	.0	.1	.0
Children in the household:												
0	4.9	.0	2.2	2.9	.0	.0	.0	.0	.0	.0	.0	.0
1-2	8.2	.0	6.1	2.2	.2	.0	.2	.0	.2	.0	.2	.0
3+	9.0	.0	7.2	1.8	.1	.0	.1	.0	.1	.0	.1	.0
With income from:												
employment	7.4	.0	4.1	3.3	.3	.0	.3	.0	.2	.0	.3	.0
self-employment	8.3	.0	5.6	2.8	.1	.0	.1	.0	.3	.0	.3	.0
agriculture	8.8	.0	7.0	1.8	.1	.0	.1	.0	.1	.0	.1	.0

Note: see Table A2.

Source: see Table A2.

Table A4: Benefit coverage (% of population) in the baseline and impact of shocks: Tanzania

| | Baseline | | | | Δ relative to baseline after shock to: | | | | | | | |
| | | | | | Earnings | | | | Employment | | | |
	B	NMTB	MTB	P	B	NMTB	MTB	P	B	NMTB	MTB	P
All	8.0	.0	8.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Age group:												
< 20	9.5	.0	9.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
20-29	5.5	.0	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
30-39	6.5	.0	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
40-49	7.8	.0	7.8	.0	.0	.0	.0	.0	.0	.0	.0	.0
50-59	6.6	.0	6.6	.0	.0	.0	.0	.0	.0	.0	.0	.0
60+	5.4	.0	5.4	.0	.0	.0	.0	.0	.0	.0	.0	.0
Women	7.8	.0	7.8	.0	.0	.0	.0	.0	.0	.0	.0	.0
Men	8.2	.0	8.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
Women in (self-)employment:												
formal	1.7	.0	1.7	.0	.0	.0	.0	.0	.0	.0	.0	.0
informal	5.0	.0	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Men in (self-)employment:												
formal	1.9	.0	1.9	.0	.0	.0	.0	.0	.0	.0	.0	.0
informal	5.2	.0	5.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
Household type:												
Female-headed hhs	7.9	.0	7.9	.0	.0	.0	.0	.0	.0	.0	.0	.0
Male-headed hhs	8.1	.0	8.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
Children in the household:												
0	1.4	.0	1.4	.0	.0	.0	.0	.0	.0	.0	.0	.0
1-2	3.6	.0	3.6	.0	.0	.0	.0	.0	.0	.0	.0	.0
3+	11.2	.0	11.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
With income from:												
employment	6.5	.0	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
self-employment	3.3	.0	3.3	.0	.0	.0	.0	.0	.0	.0	.0	.0
agriculture	8.5	.0	8.5	.0	.0	.0	.0	.0	.0	.0	.0	.0

Note: see Table A2.

Source: see Table A2.

Table A5: Benefit coverage (% of population) in the baseline and impact of shocks: Uganda

| | Baseline | | | | Δ relative to baseline after shock to: | | | | | | | |
| | | | | | Earnings | | | | Employment | | | |
	B	NMTB	MTB	P	B	NMTB	MTB	P	B	NMTB	MTB	P
All	3.8	3.8	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Age group:												
< 20	3.3	3.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20-29	2.3	2.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30-39	1.3	1.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
40-49	2.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50-59	4.1	4.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
60+	24.9	24.9	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Women	4.0	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Men	3.6	3.6	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Women in (self-)employment:												
formal	.8	.8	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
informal	2.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Men in (self-)employment:												
formal	1.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
informal	2.1	2.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Household type:												
Female-headed hhs	5.6	5.6	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Male-headed hhs	3.2	3.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Children in the household:												
0	6.6	6.6	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
1-2	4.4	4.4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
3+	3.3	3.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
With income from:												
employment	2.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
self-employment	3.1	3.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
agriculture	4.4	4.4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

Note: see Table A2.

Source: see Table A2.

Table A6: Benefit coverage (% of population) in the baseline and impact of shocks: Zambia

| | Baseline | | | | Δ relative to baseline after shock to: | | | | | | | |
| | | | | | Earnings | | | | Employment | | | |
	B	NMTB	MTB	P	B	NMTB	MTB	P	B	NMTB	MTB	P
All	53.0	39.7	23.4	.9	.0	.0	.0	.0	.0	.0	.0	.0
Age group:												
< 20	55.5	42.5	23.8	.7	.0	.0	.0	.0	.0	.0	.0	.0
20-29	44.6	32.8	18.5	1.1	.0	.0	.0	.0	.0	.0	.0	.0
30-39	44.0	35.6	15.1	.7	.0	.0	.0	.0	.0	.0	.0	.0
40-49	47.9	38.2	17.4	.8	.0	.0	.0	.0	.0	.0	.0	.0
50-59	57.8	42.0	28.1	2.0	.0	.0	.0	.0	.0	.0	.0	.0
60+	82.1	42.8	68.1	2.5	.0	.0	.0	.0	.0	.0	.0	.0
Women	53.6	39.7	24.9	.9	.0	.0	.0	.0	.0	.0	.0	.0
Men	52.3	39.8	21.9	.9	.0	.0	.0	.0	.0	.0	.0	.0
Women in (self-)employment:												
formal	25.0	16.8	6.9	4.6	.0	.0	.0	.0	.0	.0	.0	.0
informal	44.1	28.8	27.4	1.0	.0	.0	.0	.0	.0	.0	.0	.0
Men in (self-)employment:												
formal	16.4	15.1	1.4	1.1	.0	.0	.0	.0	.0	.0	.0	.0
informal	42.0	36.1	10.8	1.2	.0	.0	.0	.0	.0	.0	.0	.0
Household type:												
Female-headed hhs	70.5	34.3	60.3	1.2	.0	.0	.0	.0	.0	.0	.0	.0
Male-headed hhs	48.7	41.1	14.4	.9	.0	.0	.0	.0	.0	.0	.0	.0
Children in the household:												
0	41.3	24.3	26.2	1.4	.0	.0	.0	.0	.0	.0	.0	.0
1-2	45.5	30.9	23.1	1.5	.0	.0	.0	.0	.0	.0	.0	.0
3+	57.4	45.2	23.3	.6	.0	.0	.0	.0	.0	.0	.0	.0
With income from:												
employment	25.6	19.3	8.2	1.8	.0	.0	.0	.0	.0	.0	.0	.0
self-employment	47.9	37.7	18.9	1.4	.0	.0	.0	.0	.0	.0	.0	.0
agriculture	83.6	76.6	26.5	.7	.0	.0	.0	.0	.0	.0	.0	.0

Note: see Table A2.

Source: see Table A2.

Table A7: The consumption poverty rates in the baseline (MPC=0.7)

	Levels (%)					Δ (% points) due to			
	Total	Pre-B	Pre-NMTB	Pre-MTB	Pre-P	B	NMTB	MTB	P
A. Poverty Headcount									
Ghana	17.4***	19.1***	19.0***	17.4***	17.5***	-1.8***	-1.6***	.0	-.2***
	(.465)	(.488)	(.484)	(.465)	(.469)	(.170)	(.164)	(.000)	(.038)
Mozambique	56.7***	57.3***	56.7***	57.0***	57.1***	-.6***	.0	-.2***	-.3***
	(.488)	(.478)	(.488)	(.482)	(.486)	(.062)	(.000)	(.045)	(.042)
Tanzania	44.3***	44.3***	44.3***	44.3***	44.3***	.0	.0	.0	.0
	(.629)	(.629)	(.629)	(.629)	(.629)	(.000)	(.000)	(.000)	(.000)
Uganda	65.3***	65.5***	65.5***	65.3***	65.3***	-.1***	-.1***	.0	.0
	(.576)	(.573)	(.573)	(.576)	(.576)	(.033)	(.033)	(.000)	(.000)
Zambia	54.9***	56.3***	55.8***	55.4***	55.0***	-1.4***	-.8***	-.5***	-.0*
	(.642)	(.644)	(.646)	(.645)	(.640)	(.129)	(.102)	(.068)	(.013)
B. Poverty Gap									
Ghana	6.0***	7.1***	6.9***	6.1***	6.2***	-1.1***	-.9***	-.0***	-.1***
	(.180)	(.193)	(.189)	(.182)	(.181)	(.041)	(.030)	(.005)	(.026)
Mozambique	22.6***	23.1***	22.6***	22.9***	22.9***	-.5***	.0	-.3***	-.3***
	(.260)	(.262)	(.260)	(.262)	(.260)	(.026)	(.000)	(.013)	(.024)
Tanzania	13.1***	13.4***	13.1***	13.4***	13.1***	-.4***	.0	-.4***	.0
	(.250)	(.260)	(.250)	(.260)	(.250)	(.016)	(.000)	(.016)	(.000)
Uganda	27.8***	27.9***	27.9***	27.8***	27.8***	-.2***	-.2***	.0	.0
	(.303)	(.304)	(.304)	(.303)	(.303)	(.010)	(.010)	(.000)	(.000)
Zambia	26.9***	29.7***	28.4***	28.2***	27.0***	-2.7***	-1.5***	-1.2***	-.0***
	(.412)	(.431)	(.424)	(.418)	(.412)	(.047)	(.033)	(.033)	(.007)

Note: see Table 5. Marginal propensity to consume (MPC) assumed to equal 0.7..

Source: see Table 5.

Table A8: The consumption poverty rates in the baseline and the impact of a shock (MPC=0.7)

| | Baseline | | | Impact of a shock: change (% points) to baseline | | | | | |
| | | | | Employment shock | | | Earnings shock | | |
	Total	Pre-B	Δ B	Total	Pre-B	Δ B	Total	Pre-B	Δ B
A. Poverty Headcount									
Ghana	17.4***	19.1***	-1.8***	2.9***	2.8***	.1	3.3***	3.4***	-.1
	(.465)	(.488)	(.170)	(.242)	(.242)	(.060)	(.220)	(.219)	(.152)
Mozambique	56.7***	57.3***	-.6***	1.1***	1.1***	.0	1.5***	1.6***	-.0
	(.488)	(.478)	(.062)	(.076)	(.074)	(.027)	(.104)	(.104)	(.030)
Tanzania	44.3***	44.3***	.0	2.3***	2.3***	.0	2.7***	2.7***	.0
	(.629)	(.629)	(.000)	(.203)	(.203)	(.000)	(.199)	(.199)	(.000)
Uganda	65.3***	65.5***	-.1***	1.9***	1.9***	.0	3.1***	3.1***	.0
	(.576)	(.573)	(.033)	(.150)	(.150)	(.008)	(.217)	(.213)	(.034)
Zambia	54.9***	56.3***	-1.4***	1.5***	1.5***	-.0	1.3***	1.4***	-.1
	(.642)	(.644)	(.129)	(.171)	(.173)	(.040)	(.177)	(.194)	(.144)
B. Poverty Gap									
Ghana	6.0***	7.1***	-1.1***	2.4***	2.5***	-.1***	1.9***	2.1***	-.2***
	(.180)	(.193)	(.041)	(.205)	(.206)	(.012)	(.164)	(.172)	(.026)
Ghana	6.0***	7.1***	-1.1***	2.4***	2.5***	-.1***	1.9***	2.1***	-.2***
	(.180)	(.193)	(.041)	(.205)	(.206)	(.012)	(.164)	(.172)	(.026)
Mozambique	22.6***	23.1***	-.5***	.9***	1.0***	-.0***	.9***	.9***	-.0***
	(.260)	(.262)	(.026)	(.049)	(.049)	(.003)	(.024)	(.024)	(.002)
Tanzania	13.1***	13.4***	-.4***	2.0***	2.0***	.0**	1.4***	1.4***	.0
	(.250)	(.260)	(.016)	(.136)	(.136)	(.002)	(.050)	(.050)	(.000)
Uganda	27.8***	27.9***	-.2***	2.2***	2.2***	-.0	2.3***	2.3***	-.0***
	(.303)	(.304)	(.010)	(.117)	(.117)	(.001)	(.064)	(.064)	(.002)
Zambia	26.9***	29.7***	-2.7***	1.6***	1.6***	-.0	1.0***	1.0***	-.0***
	(.412)	(.431)	(.047)	(.130)	(.130)	(.006)	(.040)	(.041)	(.005)

Note: see Table A7.

Source: see Table A7.