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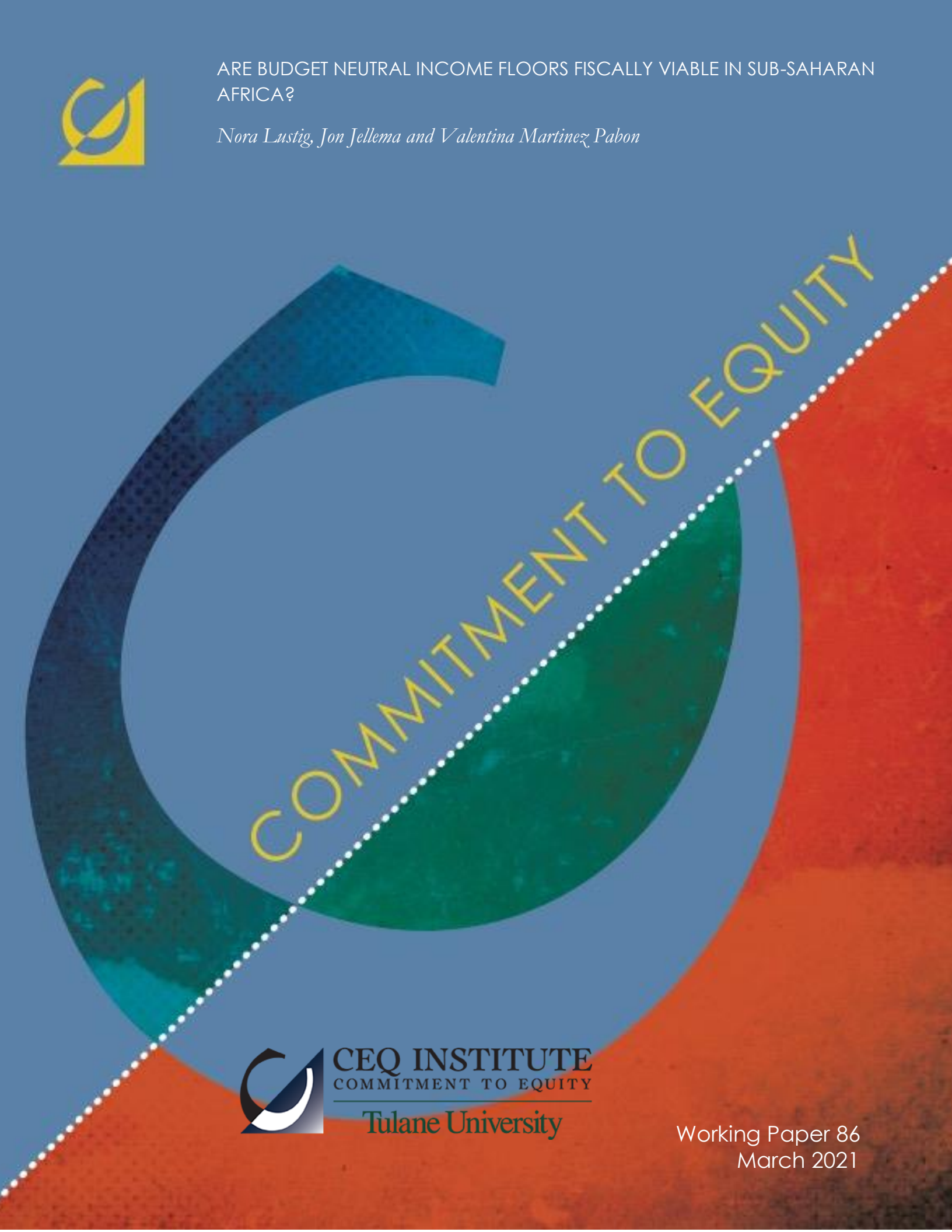

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The CEQ logo is a stylized graphical representation of a Lorenz curve for a fairly unequal distribution of income (the bottom part of the C, below the diagonal) and a concentration curve for a very progressive transfer (the top part of the C).

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ABSTRACT

Using microsimulations, we assess whether budget neutral universal income floors are fiscally viable in twelve SSA countries. We consider three universal basic income (UBI) scenarios of decreasing levels of generosity: poverty line, average poverty gap, and current spending on transfers and subsidies per person (spending neutral). The viability of the policies is assessed by comparing the results on poverty and average tax rates obtained from the simulated scenarios with those in the current system (baseline). We find that poverty line and poverty gap UBI programs would not be viable. Spending neutral UBI programs could potentially be viable in Botswana, Ghana and Zambia. If resources are targeted to the poor, a poverty line scenario is viable in Botswana, Ghana, Namibia, and South Africa.

JEL Codes: H22, I38, D31

Key words: universal basic incomes, fiscal policy, fiscal incidence, poverty, fiscal impoverishment, taxes, sub-Saharan Africa

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I. Introduction

In Sub-Saharan Africa (SSA), where poverty is still quite pervasive[1], economic growth alone might take a long time to reduce poverty substantially.[2] Furthermore, in many countries, the existing combination of taxes, transfers and subsidies makes a portion of the poor net payers into the fiscal system: that is, there is what has been called fiscal impoverishment (Higgins and Lustig, 2016).[3] While these same net payers living in poverty may be receiving transfers in kind (public education and infrastructure, for example), these are not fungible. They cannot be sold, and the money used to buy food, for instance. Could countries in the region rely on cash transfers to provide income floors to reduce or even eliminate fiscal impoverishment and poverty overall more quickly? The answer depends, first, on how income floors are defined. Second and crucially, on whether the resources required to provide an adequate income floor can be raised without potentially significant efficiency losses, in addition to political economy questions and administrative challenges. There are two obvious sources for additional spending on cash transfers: reducing expenditures on subsidies and increasing (direct and/or indirect) taxes paid by households.[4]

Using microsimulations, we attempt to answer the following overarching question: are budget neutral universal income floors fiscally viable in Sub-Saharan Africa? Our analysis is carried out in twelve SSA countries: Botswana, Comoros, eSwatini (formerly Swaziland), Ghana, Ivory Coast, Lesotho, Namibia, South Africa, Tanzania, Togo, Uganda, and Zambia. The viability of the policies simulated here is assessed by comparing the results on poverty and average tax rates obtained from the simulated scenarios with the baseline indicators. The baseline indicators are obtained from the fiscal incidence analyses generated with household surveys conducted between 2010 and 2015.[5] The fiscal incidence analyses use what is known as the accounting approach. The accounting approach followed in these studies is described in detail in Lustig (2018). These studies were converted into a set of harmonized microdata housed in the Commitment to Equity Institute[6] and the

[1] See the poverty measures on Table 1 in the next section.

[2] For example, Ivory Coast is the fastest growing economy in our sample: between 2008 and 2016, real GNI per-capita grew by nearly 30 percent. However, from 2008 to 2015, the proportion of the population living in extreme poverty (i.e., living on $PPP (2011) 1.90 per person per day or less) fell by less than one-half of a percentage point.

[3] According to the fiscal incidence analyses housed in the Commitment to Equity Data Center on Fiscal Redistribution, a portion of the poor are net payers in the following countries: Comoros, Ghana, Ivory Coast, Tanzania, Togo, and Uganda.

[4] There are other alternatives such as decreasing government spending on other items and/or increasing taxes on corporations or other entities different from households. In addition, government revenues could be raised by reducing tax evasion and tax avoidance. Analyzing these options goes beyond the scope of this paper.

[5] The description of the fiscal systems and specific assumptions for each country can be found in: Botswana (Younger, 2020); Comoros (Belghith et al., 2017); eSwatini (Renda and Goldman, 2020); Ghana (Younger, Osei-Assibey and Oppong, 2016); Ivory Coast (Tassot and Jellema, 2019); Lesotho (Houts and Goldman, 2019); Namibia (Sulla, Zikhali and Jellema, 2016 and Jellema and Renda, 2020); South Africa (Inchauste et al., 2017 and Goldman, Woolard and Jellema, 2020); Tanzania (Younger, Myamba and Mdadila, 2016); Togo (Tassot and Jellema, 2018); Uganda (Jellema et al., 2016 and Mejia-Mantilla et al., 2020); and Zambia (de la Fuente, Jellema and Rosales, 2018).

[6] This harmonized microdata is housed in the CEQ Data Center on Fiscal Redistribution and is available upon request. The request must be placed directly to the author or organization that produced the study. The contacts by country can be found in www.ceqinstitute.org.

microsimulations are applied on the harmonized microdata for each country.

We consider three universal basic income (UBI) scenarios of decreasing generosity levels: poverty line, average poverty gap, and current spending on transfers and subsidies per person. For the poverty line scenarios (and, to calculate the average poverty gap and all the indicators), we define two types of "income floors." In addition to the UBI scenarios, we consider the same three scenarios of decreasing generosity but in which transfers are targeted to the poor: that is, would it be fiscally viable to provide an income floor at least for the poor?

Income floors are defined as follows. The lower income floor is set at the World Bank International Poverty Line of US$1.90 a day (in 2011 PPP).[7] The highest income floor is set at the country specific World Bank Income Class International Poverty Lines. In our country set, there are three income class-specific poverty lines: US$1.90 a day for low-income countries (Comoros, Tanzania, Togo, and Uganda); US$3.20 a day for lower middle-income countries (eSwatini, Ghana, Ivory Coast, Lesotho, and Zambia); and, US$5.50 a day for upper middle-income countries (Botswana, Namibia, and South Africa).

We define a policy option as *viable* if four conditions are met. Two of the conditions relate to the poverty impact and two to the impact on tax burdens. Regarding the poverty impact, first, we require that the fiscal system is not poverty increasing.[8] In particular, we require that the postfiscal headcount ratio and the squared poverty gap index, both measured with *consumable* income, should not be higher than the prefiscal one. Consumable income is equal to prefiscal income minus direct *and* indirect taxes plus cash transfers *and* consumption subsidies.[9] We prefer to use consumable income as the welfare indicator rather than the more frequently used disposable income concept because the latter does not incorporate the extent to which individuals pay net indirect taxes. To measure poverty, we use two poverty lines: the World Bank International Poverty Line of US$1.90 a day (in 2011 PPP)[10] and the country specific World Bank Income Class International Poverty Lines.[11] The fiscal incidence analyses showed that in Comoros, Ghana, Ivory Coast, Tanzania, Togo, Uganda, and Zambia, the incidence of taxes, transfers, and subsidies in the baseline is such that poverty is higher than the prefiscal income poverty.[12] This undesirable result is broadly due to the fact that the poor (and near poor) pay consumption taxes but receive very little in the form of cash transfers and only a small share of total subsidies. Fiscal impoverishment is a characteristic one would prefer to eliminate with an alternative

[7] This International Poverty Line is used to track progress of Goal 1, Target 1 of the Sustainable Development Goals.
[8] How would it be possible for an outcome to be worse? It could happen because the additional taxes required to make the new scheme budget neutral have a net effect that causes poverty to rise, for example.
[9] Note that this income concept is different from what international databases such as the World Bank's PovCal report. The inequality and poverty indicators in international databases *never* include the effect of indirect taxes or subsidies on measured inequality and poverty. Thus, the measures shown in this paper cannot be directly compared to those in such databases or even most country studies, unless they used consumable income as the welfare indicator. On the specific differences of income concepts, see chapters 1 and 6 in Lustig (2018) for details.
[10] This International Poverty Line is used to track progress of Goal 1, Target 1 of the Sustainable Development Goals.
[11] For details, see Jolliffe and Prydz (2016).
[12] This result occurred whether one used the lowest World Bank's International Poverty Line of $1.90 (2011 PPP) a day or the World Bank's country specific international poverty lines (Jolliffe and Prydz, 2016).

scheme of taxes and transfers. Otherwise, we would be defeating one of the main purposes of considering an alternative to the existing (baseline) system.

Second, we require that the poverty outcome is not worse than under the current system: that is, we require that the postfiscal squared poverty gap index, again, measured with consumable income should not be higher than in the current system. We prefer to use the squared poverty gap index than the more common headcount ratio because the latter can change with small increases in income for those below but close to the poverty line while the poorest of the poor could be left untouched or even made worse off.

For the cases in which the two poverty conditions are met, we eliminate the scenarios whenever the policy option is not feasible because of their impact on tax burdens. Policy changes are considered *not feasible* if the required increase in taxes yields nonsensical results: taxes would have to be increased by so much that consumable income turns out negative for a share of the population, and there is extreme reranking (i.e., some of the prefiscal richest become postfiscal poorest). This is our third condition. For the cases in which the two poverty conditions are met and the impact on tax burdens is feasible (as just defined), we require the policy option to imply an increase in taxes within a reasonable bound. While there are no general conventions on the latter, we leave out a policy scenarios that imply an increase in the average tax rate for each prefiscal income decile of 10 percent or above. The scenarios that fulfill the poverty condition and are feasible but imply a change in tax rates of 10 percent or above are excluded from the viable set. This is our fourth condition. To assess the sensitivity of our results to this tax threshold, we repeated the exercise allowing different changes in average tax rates. We found that the number of viable cases changes relatively little even if the threshold is raised to 25 percent.[13]

The fact that a number of scenarios are not viable may be due to measurement errors --such as underreporting and undercoverage especially in the upper tail-- that affect the income and expenditure variables in household surveys. Thus, for each of the simulated policies, we present two alternative fiscal options. In the first option, total subsidies and taxes are equal to what is obtained from the incomes captured in the survey. In the second, the total subsidies and taxes are equal to the amounts reported in administrative accounts. For simplicity, we treat these as *lower bound* and *upper bounds* in terms of resource availability. Of course, other measurement errors could affect our results. As shown by Beegle et al. (2012) and Beegle et al. (2016), recorded expenditures —and, thus, poverty measures-- in household surveys suffer from measurement errors and comparability issues associated with the method of data collection (diary versus recall; individual versus household; the reference period; and, the degree of commodity detail). If these errors could cause an overestimation of prefiscal poverty, then some of the policy scenarios that are not viable in our present analysis could potentially switch to becoming viable. In contrast, whenever the errors result in an underestimation, the scenarios that are not viable under our analysis would be even less viable, and the few that we found viable could

[13] Results for setting the threshold at 5, 20 and 25 percent are available upon request. It is worth noting that the number of viable cases changes relatively little as the threshold rises.

become not viable. While assessing the extent and direction of the measurement errors result in over or underestimation of poverty in the countries analyzed here is beyond the scope of this paper, an actual assessment of the policy alternatives should carry out robustness checks based on what one knows about the surveys in specific countries.

Our results suggest that a UBI reform is not viable either under the poverty line or poverty gap generosity levels because of the required increase in taxes. This is the case even with the lower poverty line or the upper bound in available resources. With a less generous transfer such as the one that corresponds to the spending neutral scenario and the $1.90 poverty line, of the twelve countries considered here a UBI becomes viable in Botswana and, when we consider the upper bound of resources, in Ghana and Zambia too. Botswana, Ghana, Namibia and South Africa could introduce income floors *targeted* to the poor but just for the $1.90 poverty line. In other words, in those countries, the generosity of targeted transfers could, in principle, be increased if the short-term poverty outcomes were our sole concern. None of the scenarios examined here—whether universal or targeted and even with the lower poverty line and the upper bound in resource availability—would eliminate fiscal impoverishment in Comoros, Ivory Coast, Tanzania, Togo, and Uganda.

The microsimulation method applied here ignores behavioral and general equilibrium effects.[14] In other words, we capture the first-round effects. In the literature, first-round effects are often considered acceptable.[15] Furthermore, while focusing on the first-round effects is a limitation, if the policy alternatives are not viable in the absence of labor supply and other behavioral responses, they would be even less viable if the latter were taken into account. An illustration of the latter is that budget neutrality will not be attained if, for instance, workers respond to the required rise in taxes by reducing their labor force participation and/or hours worked resulting in a lower collection of taxes than anticipated. Another example: the deadweight costs of higher taxes could cause lower growth and, thus, higher levels of prefiscal poverty and lower than anticipated postreform tax collection. Having said this, for the viable scenarios under the pure accounting approach, one would need to determine whether their viability would hold under possible behavioral responses especially regarding labor supply. We presume these to be small because we have restricted the allowed increase in the average tax rate to 10 percent.

[14] Behavioral responses can manifest themselves both through the impact of taxes and transfers especially on labor supply. Changing transfers, for example, could potentially trigger labor supply responses that raise postreform prefiscal poverty and reduce tax collection. The literature that has surveyed labor supply responses (for example, Fiszbein and Schady, 2008 and Bastagli et al., 2016), however, does not find that—in general--cash transfers cause a reduction in adult labor supply. In fact, some studies find that the adult labor supply goes up with cash transfers. If the latter is the case, the postreform prefiscal poverty levels could be lower than what is found under microsimulations that follow the accounting approach and some scenarios deemed as not viable could potentially switch to becoming viable. While estimating this goes beyond the scope of this paper, policymakers considering a reform to their transfers system should take these into account.

[15] David Coady et al., for instance, state, "The first order estimate is much easier to calculate, provides a bound on the real-income effect, and is likely to closely approximate a more sophisticated estimate. Finally, since one expects that short-run substitution elasticities are smaller than long-run elasticities, the first-order estimate will be a better approximation of the short-run welfare impact" (Coady et al., 2006, p. 9).

II. Country Coverage and Data

Our analysis covers twelve countries: Botswana, Comoros, eSwatini, Ghana, Ivory Coast, Lesotho, Namibia (in two different fiscal years), South Africa (in two different fiscal years), Tanzania, Togo, Uganda (in two different fiscal years), and Zambia. Our country sample represents diversity in both macroeconomic and fiscal characteristics. According to the World Bank classification system, for example, four countries in our set are low-income countries (Comoros, Tanzania, Togo and Uganda), five are lower middle-income countries (eSwatini, Ghana, Ivory Coast, Lesotho and Zambia), and three are upper middle-income ones (Botswana, Namibia and South Africa). Comoros, Uganda, and Tanzania are in East Africa; Botswana, eSwatini, Lesotho, Namibia, South Africa, and Zambia in Southern Africa; and Ghana, Ivory Coast and Togo in West Africa. The twelve countries also feature distinct public social welfare systems. In particular, government spending on cash transfers programs as a percent of prefiscal income ranges from zero or almost zero (Comoros, Ivory Coast, Togo, Uganda and Zambia); above 0.1 percent but less than 0.5 percent (Ghana and Tanzania); to levels of spending comparable to advanced OECD countries in Botswana, Lesotho, Namibia and South Africa. Except for Botswana and Namibia, subsidies represent between 70 and 100 percent of government spending in the combined category of transfers and subsidies (Table 1).

Table 1: Gross National Income Per Capita, Population, Prefiscal Poverty, and the Size of Taxes and Transfers[16]

Panel (a) Characteristics

Country	Year	Development category (2018)	GNI per capita ($PPP 2011)	Cummulative growth in real GNI per capita (%), 2013-2017	Population (Millions)	Poverty headcount ratio (%), $1.90 a day poverty line	Poverty headcount ratio (%), Country-specific poverty line	Squared poverty gap (%), $1.90 a day poverty line	Squared poverty gap (%), Country-specific poverty line
Botswana	2010	UMI	12,680	-1.4	2.0	21.7	58.3	4.8	20.5
Comoros	2014	LI	2,520	1.5	0.8	13.6	13.6	1.6	1.6
eSwatini	2017	LMI	7,840	0.0	1.1	25.2	49.5	3.3	10.5
Ghana	2013	LMI	5,150	6.8	26.6	10.2	29.3	1.3	4.6
Ivory Coast	2015	LMI	4,550	24.8	23.2	22.8	52.4	3.2	10.0
Lesotho	2017	LMI	3,150	1.0	2.1	32.1	51.6	9.5	17.1
Namibia	2010	UMI	8,060	0.5	2.1	31.5	68.9	7.8	27.8
Namibia	2016	UMI	10,170	0.5	2.4	18.9	54.2	5.3	18.7
South Africa	2010	UMI	11,470	-1.6	51.2	32.3	57.0	16.1	29.2
South Africa	2015	UMI	12,240	-1.6	55.4	36.7	61.5	20.9	34.0
Tanzania	2011	LI	2,190	13.8	45.7	49.8	49.8	6.7	6.7
Togo	2015	LI	1,440	10.9	7.3	36.7	36.7	6.2	6.2
Uganda	2012	LI	1,970	3.6	34.6	37.1	37.1	5.0	5.0
Uganda	2016	LI	2,050	3.6	39.6	44.9	44.9	6.9	6.9
Zambia	2015	LMI	3,360	NA	15.9	57.5	72.9	19.0	31.6
Average			*5,923*	*4.5*	*20.7*	*31.4*	*49.2*	*7.8*	*15.4*

[16] Note that the size of taxes and transfers with respect to prefiscal income shown in Table 1 is calculated as the ratio of taxes and transfers included in the fiscal incidence analysis to the prefiscal incomes in the household surveys and, thus, will not equal the ratio of taxes and transfers to GDP calculated from administrative data, except by chance.

Panel (b) Taxes, transfers and subsidies (% of Prefiscal Income)

Country	Year	Direct taxes	Indirect taxes	Total taxes	Indirect taxes as a share of total taxes	Direct transfers	Indirect subsidies	Total transfers plus subsidies	Total transfers plus subsidies as a share of total taxes
Botswana	2010	4.9	6.4	11.3	56.4	3.5	0.6	4.1	36.4
Comoros	2014	1.3	2.2	3.5	63.6	-	-	-	-
eSwatini	2017	5.5	6.5	12.0	54.3	2.1	-	2.1	17.1
Ghana	2013	4.5	6.3	10.9	58.1	0.2	2.1	2.3	21.0
Ivory Coast	2015	1.1	4.2	5.3	79.6	-	0.5	0.5	9.1
Lesotho	2017	9.3	10.0	19.3	51.9	5.7	-	5.7	29.3
Namibia	2010	7.3	7.6	14.9	50.9	4.2	0.8	5.0	33.6
Namibia	2016	7.5	7.8	15.3	51.2	2.5	0.1	2.6	17.2
South Africa	2010	20.4	10.3	30.7	33.5	5.2	-	5.2	16.9
South Africa	2015	12.2	13.9	26.1	53.2	8.0	-	8.0	30.7
Tanzania	2011	4.3	12.5	16.8	74.5	0.4	0.9	1.3	7.7
Togo	2015	0.9	12.1	13.0	92.8	-	0.2	0.2	1.5
Uganda	2012	2.6	5.7	8.2	68.8	0.1	0.3	0.3	4.2
Uganda	2016	2.8	6.1	9.0	68.6	0.1	0.8	0.9	10.6
Zambia	2015	4.3	2.3	6.6	35.2	0.1	0.9	1.1	15.9
Average		*5.9*	*7.6*	*13.5*	*59.5*	*2.7*	*0.7*	*2.8*	*18.0*

Notes:

GNI per capita, population, and poverty measures are for the same year as the survey. The poverty measures are for prefiscal income based on the sources below. Prefiscal income here is market income plus income from contributory pensions; see Figure 1 and corresponding section for details.

Country specific poverty lines are: Comoros, Tanzania, Togo and Uganda: $1.90 a day international poverty line. eSwatini, Ghana, Ivory Coast, Lesotho and Zambia: $3.20 a day international poverty line. Botswana, Namibia and South Africa: $5.50 a day international poverty line.

Source: Botswana (Younger, 2020); Comoros (Belghith et al., 2017); eSwatini (Renda and Goldman, 2020); Ghana (Younger, Osei-Assibey and Oppong, 2016); Ivory Coast (Tassot and Jellema, 2019); Lesotho (Houts and Goldman, 2019); Namibia (Sulla, Zikhali and Jellema, 2016 and Jellema and Renda, 2020); South Africa (Inchauste et al., 2017 and Goldman, Woolard and Jellema, 2020); Tanzania (Younger, Myamba and Mdadila, 2016); Togo (Tassot and Jellema, 2018); Uganda (Jellema et al., 2016 and Mejia-Mantilla et al., 2020); Zambia (de la Fuente, Jellema and Rosales, 2018); GNI per capita and population available from the World Bank's World Development Indicators; accessed in January 2021.

To calculate the baseline indicators and for the microsimulations we use the harmonized microdata housed in the CEQ Data Center on Fiscal Redistribution.[17] These harmonized microdata was generated from individual fiscal incidence studies based on household surveys conducted between 2010 and 2015.[18] Rooted in the field of Public Finance, fiscal incidence analysis is the method utilized

[17] Available upon request. To learn more about the Commitment to Equity Institute and the Data Center, visit http://www.ceqinstitute.org/.

[18] The household surveys are: Botswana: Botswana Core Welfare Indicators Survey (2010); Comoros: Enquête sur L'emploi, le Secteur Informel et la Consommation des Ménages aux Comores (2014); eSwatini: Swaziland Household Income and Expenditure Survey (2016-2017); Ghana: Living Standards Survey (2012-2013); Ivory Coast: Enquête sur le Niveau de Vie des Ménages (2015); Lesotho: Lesotho Multipurpose Household Survey (2016); Namibia Household Income and Expenditure Survey (2009-2010) and (2015-2016); South Africa: Income and Expenditure Survey

to allocate taxes and public spending to households so that one can compare incomes before taxes and transfers with incomes after them. Standard fiscal incidence analysis just looks at what is paid and what is received without assessing the behavioral responses that taxes and public spending may trigger on individuals or households. This is often referred to as the "accounting approach." An important advantage of using the harmonized microdata from the CEQ Data Center is that the studies were produced using a common methodological framework for calculating the incidence of taxes and benefits described in Lustig (2018).[19] The description of the fiscal systems, assumptions, and fiscal incidence results can be found in: Botswana (Younger, 2020); Comoros (Belghith et al., 2017); eSwatini (Renda and Goldman, 2020); Ghana (Younger, Osei-Assibey and Oppong, 2016); Ivory Coast (Tassot and Jellema, 2019); Lesotho (Houts and Goldman, 2019); Namibia (Sulla, Zikhali and Jellema, 2016 and Jellema and Renda, 2020); South Africa (Inchauste et al., 2017 and Goldman, Woolard and Jellema, 2020); Tanzania (Younger, Myamba and Mdadila, 2016); Togo (Tassot and Jellema, 2018); Uganda (Jellema et al., 2016 and Mejia-Mantilla et al., 2020); and Zambia (de la Fuente, Jellema and Rosales, 2018).

These fiscal incidence studies estimate how tax burdens and transfer and subsidy benefits are distributed among individuals and provide estimates of the impact of the fiscal system on poverty via the use of prefiscal and postfiscal income concepts (see Figure 1 in the methodology section). In all but the case of Uganda (2012), the fiscal incidence analyses incorporated the indirect effects of subsidies and indirect taxes.[20] Indirect effects may occur when the subsidized (taxed) good is used as an input in the production of other goods. For example, fuel subsidies have a direct benefit to consumers when they buy gasoline or kerosene and an indirect benefit in the form of lower transport prices.[21]

The fiscal incidence studies used here are point-in-time rather than lifecycle and do not incorporate behavioral or general equilibrium effects. That is, the derived prefiscal income cannot be presumed to equal the true counterfactual income in the absence of taxes and transfers. It is a first-order

(2010/2011); Tanzania: Household Budget Survey (2011-2012); Togo: Questionnaire des Indicateurs de Base du Bien-être (2015); Uganda: National Household Survey (2012-2013) and (2016-2017); and, Zambia: Living Conditions Monitoring Survey (2015). Except for South Africa's household survey, which reports on incomes and expenditures, the rest of the countries' surveys report consumption only.

[19] For details, see chapters 1, 4, 6, and 8 in Lustig (2018).

[20] Comoros, eSwatini and Lesotho have no subsidies. The following countries in our sample include the indirect effects: Botswana: indirect effects for indirect taxes; eSwatini: indirect effects for indirect taxes; Ghana: indirect effects for VAT and electricity subsidies; Ivory Coast: indirect effects for indirect taxes and electricity subsidies; the subsidies are allocated to households based on their share of electricity consumption as a proportion of total consumption of electricity; Lesotho: indirect effects for indirect taxes; Namibia: indirect effects for taxes and subsidies are estimated using the Input-Output method (Jellema and Inchauste, 2018); South Africa: indirect effects for taxes and subsidies are estimated using the Input-Output method; Tanzania: indirect effects for petroleum and import duties but no indirect effects for value added tax or subsidies; Togo: indirect effects for indirect taxes and electricity subsidies; the subsidies are allocated to households based on their share of electricity consumption as a proportion of total consumption of electricity; Uganda (2016): indirect effects for indirect taxes and subsidies; Zambia: indirect effects for taxes and subsidies are estimated using the Input-Output method.

[21] Details on informality, tax evasion and direct and indirect effects are described in the fiscal incidence studies for the twelve countries cited in the text.

approximation. As stated in the introduction, a first-order approximation suffices for a reasonable impact estimate.[22] In essence, the underlying assumption is that payroll taxes and contributions (both by employee and employer) in the formal sector are borne by labor and that consumption taxes (and subsidies) are fully shifted forward to consumers. The economic incidence, strictly speaking, depends on the elasticity of demand and/or supply of a factor or a good, and the ensuing general equilibrium effects. The accounting approach implicitly assumes zero demand price and labor supply elasticities, and zero elasticities of substitution among inputs, which may not be far-fetched assumptions for analyzing effects in the short-run, especially when changes are small. The baseline scenario is not, however, a mechanical application of statutory rules. We take into account tax evasion and avoidance. For example, individuals who do not report being registered in the social security administration are assumed not to pay personal income and payroll taxes. In the case of consumption taxes, we generate effective rates of taxation – which we use in place of the statutory rates – by calculating the actual revenues collected by the revenue authority over the actual sales value of the taxable base.

III. Methodology

Our main question is whether budget neutral universal income floors are viable in the twelve SSA analyzed here. For this purpose, we simulate several budget neutral scenarios that entail different combinations of cash transfers and taxes born by households (direct or indirect). In all scenarios, we eliminate consumption subsidies and add the funds to the pool available for transfers.[23] Thus, consumption subsidies become the first source of financing of the scenarios under consideration. In order to attain budget neutrality, the next source of financing is direct (personal income and payroll) and consumption (VAT, sales, excise, etc.) taxes. The scenarios and income floors are described in detail below.

Our microsimulations ignore behavioral and general equilibrium effects. In other words, we capture the first-round effects. While this is a limitation, if the policy alternatives are not viable in the absence of labor supply and other behavioral responses, they would be even less viable if the latter were taken into account. An illustration of the latter is that budget neutrality will not be attained if, for instance, workers respond to the required rise in taxes by reducing their labor force participation and/or hours worked resulting in a lower collection of taxes than anticipated. Another example: the deadweight costs of higher taxes could cause lower growth and, thus, higher levels of prefiscal poverty and lower than anticipated postreform tax collection. Having said this, for the viable scenarios under the pure accounting approach, one would need to determine whether their viability would hold under possible behavioral responses especially regarding labor supply. We presume these to be small because we have restricted the allowed increase in the average tax rate of each decile (with households ranked by prefiscal income) to 10 percent.

[22] Although public spending on, for example, education, health, and infrastructure has an inherent investment element that is likely to affect long-run poverty dynamics, we do not attempt to capture these dynamic effects.

[23] In order to simplify the analysis, we have assumed current program-specific expenditures can be transformed costlessly into other program-specific expenditures.

Behavioral responses, however, operate not just through the tax mechanism. Changing transfers per se, could also potentially trigger labor supply responses that raise postreform prefiscal poverty and reduce tax collection. The literature that has surveyed supply responses (for example, Fiszbein and Schady, 2008 and Bastagli et al., 2016), however, does not find that—in general--cash transfers cause a reduction in adult labor supply. In fact, some studies find that adult labor supply goes up with cash transfers. If the latter is the case, the postreform prefiscal poverty levels could be lower than what is found under microsimulations that follow the accounting approach and some scenarios deemed as not viable could potentially switch to becoming viable. While estimating this goes beyond the scope of this paper, policymakers considering a reform to their transfers system should take these into account.

The viability of the policies simulated here is assessed by comparing the results on poverty and average tax rates obtained from the simulated scenarios with the baseline indicators. We define a scenario as *viable* if four conditions are fulfilled. First, under the simulated policy option, the fiscal system is no longer poverty increasing (measured with the headcount ratio and the squared poverty gap index). This condition is violated in the baseline in Comoros, Ghana, Ivory Coast, Tanzania, Togo, Uganda and Zambia where postfiscal poverty (measured with consumable income) is higher than prefiscal poverty.[24] We want a combination of taxes and transfers where this no longer occurs: that is, the postfiscal headcount ratio and the squared poverty gap must be lower than the prefiscal ones. Second, provided that the first condition is met, we require that the poverty outcome of the policy alternative is not worse than under the current system (baseline): that is, we require that the postfiscal squared poverty gap index should not be higher than in the baseline.[25] Third, for the cases in which the two poverty conditions are met, we eliminate the scenarios whenever the policy option is not feasible. Policy changes are considered *not feasible* if the required increase in taxes yields nonsensical results. A nonsensical result occurs whenever taxes would have to be increased by so much that consumable income turns out negative for a share of the population and there is extreme reranking (i.e., some of the prefiscal richest become postfiscal poorest). Fourth, we require the policy option to imply an increase in taxes that is within a reasonable bound. While there are no general conventions on the latter, we leave out of our viable set a policy scenario that implies an increase in the average tax rate of each decile above 10 percent. The scenarios that fulfill the poverty conditions and are feasible but imply a change in average tax rates above this threshold are excluded from the viable set.

One can ensure that the income floor (under either definition) is achieved by setting the transfer equal to the poverty line and giving it to everybody in the population or those below the poverty line. The first scenario is universal and the second is targeted. The universal transfer would have the advantage that the income floor is achieved by everyone at all times. Following the literature, we call

[24] Recall that consumable income is equal to prefiscal income minus direct and indirect taxes plus cash transfers and consumption subsidies (Figure 1).

[25] As we shall see below, all the cases in which this is achieved the headcount ratio is also lower. For reasons discussed below, imposing the condition on the squared poverty gap is preferable.

such a program a Universal Basic Income or UBI. A UBI might be preferred over a targeted system for a variety of reasons. A UBI is often seen as an attractive policy option because, in theory, it can provide a broad-based safety net for income-earning related contingencies, avoid errors of exclusion frequently observed in targeted programs, eliminate issues of stigma, entail administrative simplicity, and ensure more political buy-in because everybody could potentially receive a (net) benefit. Another potential advantage is that, in the face of an income shock, a UBI can provide an income floor to individuals regardless of whether they are employed in the formal or informal sectors or not employed at all. Thus, a UBI can provide a consumption-smoothing mechanism in contexts where credit and insurance markets are imperfect or in the face of systemic shocks. The onset of the COVID-19 pandemic reminded us how important a safety net with a wide coverage of the population is.

Using microsimulation, we estimate the impact of alternative budget neutral scenarios on poverty and tax burdens. We consider three universal basic income (UBI) scenarios of decreasing levels of generosity: poverty line, average poverty gap, and current spending on transfers and subsidies per person. We also consider targeted scenarios. We start by reporting poverty in the "baseline scenario:" that is, in the existing fiscal system (Table 1). We then simulate a poverty line scenario for the UBI and for the population under the poverty line. We call the latter targeted. The poverty line scenarios would eliminate poverty by definition. In the case of the poverty line UBI, poverty would be eliminated at all times since the existing (and, importantly, new) prefiscal poor would be protected from falling into poverty by their entitled transfer.

As we shall see below, the poverty line alternative is not a fiscally feasible option in general. Thus, we also consider a less generous transfer: the poverty gap scenario. In this scenario, the size of the universal transfer is set equal to the average poverty gap measured with prefiscal income (i.e., income before taxes and transfers). Total resources required under the UBI poverty gap scenario are identical to those needed to eradicate poverty under a perfect targeting scheme. To ensure budget neutrality in the poverty line and the poverty gap scenarios, taxes are adjusted accordingly. Our simulations consider two broad tax options: direct taxes on personal incomes and indirect taxes on consumption (VAT, excise and sales taxes, etc.).

Lastly, we simulate a spending neutral scenario: i.e., a reform that does not require a change in taxes. In this spending neutral scenario, we take current spending on transfers and subsidies and allocate the funds universally or perfectly targeted. In the UBI spending neutral scenario, the whole population receives a per capita transfer equal to the sum of existing transfers and consumption subsidies divided by the total population. Under the perfect targeting rule, everybody below the poverty line receives transfers in lexicographic ordering depending on their corresponding poverty gap until resources are exhausted.

In sum, we have ten scenarios (Table 2). There are four poverty line scenarios: universal and targeted and whether budget neutrality is attained through direct or indirect taxes. There are also four poverty gap scenarios: universal and perfect targeting and whether budget neutrality is attained

through direct or indirect taxes. There are only two spending neutral scenarios—universal and perfect targeting-- since taxes are not adjusted by assumption.

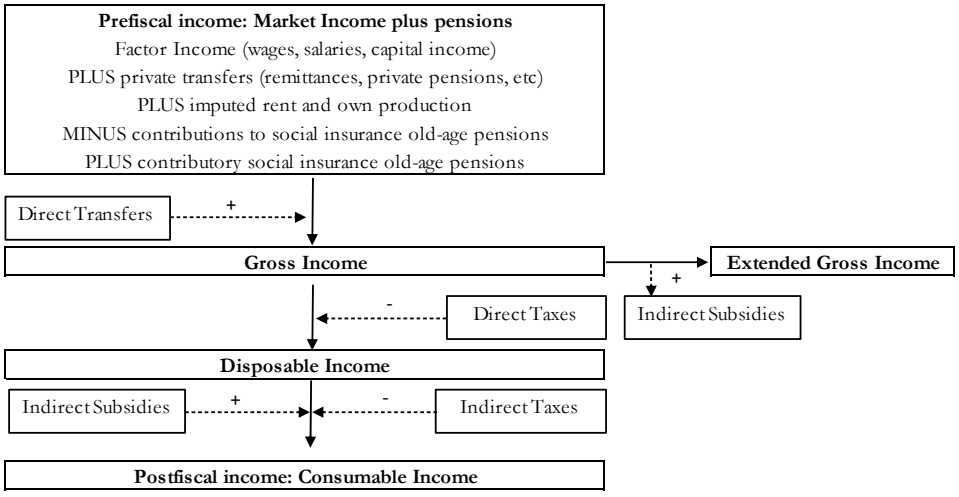
Table 2. Simulated Scenarios: Poverty Line, Poverty Gap and Spending Neutral

Scenario	Transfer System	Budget	Source of additional financing	Eligibility rules	Average transfer per beneficiary	Allocation rule
Poverty Line	Universal	Selected poverty line times total population	Direct Taxes	Total population	International $1.90 poverty line and International Country-specific poverty line	Allocated to every individual
			Indirect Taxes			
	Targeted	Selected poverty line times the number of individuals with prefiscal income below the selected poverty line	Direct Taxes	Anybody with prefiscal income below the selected poverty line (International $1.90 or International Country- specific)		Allocated to individuals below the selected poverty line
			Indirect Taxes			
Poverty Gap	Universal	Average poverty gap times total population	Direct Taxes	Total population	Average poverty gap	Allocated to every individual
			Indirect Taxes			
	Targeted	Total poverty gap	Direct Taxes	Anybody with prefiscal income below the selected poverty line (International $1.90 or International Country- specific)		Allocated to individuals below the selected poverty line in the amount necessary to close each individual's poverty gap
			Indirect Taxes			
Spending Neutral	Universal	Total direct transfers and subsidies in current system	Not applicable	Total population	Total spending on cash transfers and subsidies in baseline divided by the total population	Allocated to every individual
	Targeted			Anybody with prefiscal income below the selected poverty line (International $1.90 or International Country- specific)	Total spending on cash transfers and subsidies in baseline divided by the sum of individuals reached by the allocation rule	Allocation proceeds lexicographically as follows: starting with the poorest individual, she or he receives a transfer until her/his income equals the income of the second poorest individual; then the poorest and second poorest individuals receive transfers until their incomes are equal to the income of the third poorest individual, and so on. This procedure is repeated until resources are exhausted

The welfare concept (that is, the postfiscal income concept) used in our analysis is "income" per person after both direct *and* indirect taxes net of cash transfers and subsidies. Strictly speaking, we use expenditures because it is the variable reported in the household surveys used here. For the construction of consumable income, we assume that expenditures are equal to disposable income (i.e.,

there are no savings or dissavings).[26] In the literature, this income concept is known as *consumable income*.[27] While data on poverty is usually reported for *disposable income* (income after direct taxes net of cash transfers), we consider consumable income the relevant welfare concept because it captures what people are really able to consume after one takes into account what they pay in consumption taxes and receive in the form of consumption subsidies when they use their income to make purchases.[28] Figure 1 shows the definition of the income concepts used here. The prefiscal income concept used in our simulations is *market income plus pensions*.[29] It is equal to earned and unearned income from wages and capital,[30] plus private transfers, plus pensions from public contributory pension systems.[31] Income from noncontributory pensions (also known as social pensions), in contrast, is treated as a government transfer.

Figure 1: Prefiscal and Postfiscal Income Concepts



Source: Adapted from Lustig (2018).

We estimate the poverty impact for the baseline and the ten scenarios using two poverty lines which correspond to two notions of income floors: a minimum and a country specific one. The

[26] For more details, see Lustig (2018), chapter 6. The welfare measure includes consumption of own production (except for South Africa) and imputed rent for owner's occupied housing (except for Tanzania).

[27] Note that this welfare variable is different from what international databases such as the World Bank's PovCal report. The inequality and poverty indicators in international databases are (primarily) for *disposable income*; that is, they *never* include the effect of indirect taxes or subsidies on measured inequality and poverty.

[28] Think about two households in different countries with identical disposable incomes but in one country food is exempt from VAT and in the other the VAT rate is 10 percent. Clearly, the welfare level of these two households would not be the same.

[29] In our sample the welfare variable observed directly in the survey is consumption expenditure, which we define as Disposable Income for CEQ Assessment purposes. The construction of prefiscal income proceeds "backwards", or by adding direct taxes and subtracting cash transfers to the observed Disposable Income to arrive at prefiscal income. For details, see chapter 6 by Higgins and Lustig (2018) in Lustig (2018).

[30] Incomes from capital tend to be grossly underreported in household surveys. In particular, they do not include undistributed profits, for example.

[31] In other words, income from old-age pensions in contributory systems is considered part of prefiscal income (contributions are treated as a form of forced savings) and not treated as a government transfer. The rationale behind this assumption is discussed in Lustig and Higgins (2018) (chapter 1 of Lustig, 2018).

minimum income floor is defined by the World Bank's international poverty line of $1.90 a day (in 2011 PPP). This poverty line is the conventional benchmark used to track progress in poverty reduction by the international community.[32] The country specific income floor uses the World Bank Income Class International Poverty Lines, which vary by countries' income levels.[33] In our country set, there are three income class-specific poverty lines: US$1.90 a day for low income countries (Comoros, Tanzania, Togo and Uganda); US$3.20 a day for lower middle-income countries (eSwatini, Ghana, Ivory Coast, Lesotho and Zambia); and, US$5.50 a day for upper middle-income countries (Botswana, Namibia and South Africa).

We measure the impact on poverty with two commonly used indicators: the incidence (headcount ratio) and the severity (squared poverty gap) of poverty. The squared poverty gap index captures what happens to the poorest rather than those close to the poverty line, a drawback of the headcount ratio. We estimate poverty indicators on both the prefiscal and postfiscal income concepts and calculate the change in the headcount ratio and the squared poverty gap index for the baseline and each of the ten scenarios. Results are presented for the latter in the main text while the headcount ratio results are in the Statistical Annex.

The impact on tax burdens is assessed by the difference in the incidence of taxes (average tax rate) of each decile for each scenario and the baseline. The baseline incidence of taxes here is defined as the ratio of total direct (personal income and payroll taxes) and indirect (consumption) taxes to gross income plus subsidies, a concept that we shall call *extended gross income* (Figure 1). Following the public finance literature, we assume that --just as one can treat labor income taxes and consumption taxes as equivalent--,[34] one can also treat direct transfers and consumption subsidies as equivalent too. Thus, the relevant tax incidence concept here combines direct and consumption taxes in the numerator and prefiscal income plus direct transfers and consumption subsidies in the denominator (what we call extended gross income). Since in all our simulated scenarios subsidies are eliminated (and the savings are used as a source of financing), gross income and extended gross income are identical by definition.

To calculate the financing gap for the scenarios that are not spending-neutral, we first calculate the difference between the cost under the corresponding simulated scenario and the cost in the baseline. In the baseline and the spending neutral scenario, the cost equals the baseline spending on transfers and subsidies. In the poverty gap scenario, the cost equals the average poverty gap multiplied

32 Goal 1, Target 1 of the Sustainable Development Goals (SDG) specifies: "By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day." https://sustainabledevelopment.un.org/topics/povertyeradication The $1.25 poverty line was calculated using the purchasing power parity conversion factors for 2005. In October 2015, however, the official international poverty line to track SDG progress was changed to $1.90 a day, which was calculated using the 2011 purchasing power parity conversion factors. See http://www.worldbank.org/en/topic/poverty/brief/global-poverty-line-faq.

33 As described by Jolliffe and Prydz (2016), each income class-specific poverty line is chosen as the median of the national poverty lines of the countries in that income class. These country specific international poverty lines should not be confused with national extreme or moderate poverty lines.

34 Initially posited by Mirrlees (1971) and developed by Atkinson and Stiglitz (1976).

by the total population (universal) or by the number of poor (perfect targeting). In the poverty line scenarios, the cost equals the poverty line multiplied by the total population (universal) or by the number of poor individuals (perfect targeting). This is the gross financing gap, which is a positive number except in the spending-neutral scenarios when it is zero.[35] However, note that the gross financing gap or cost does not correspond to the actual financing gap because under the simulated scenarios, the incomes and consumption transactions on which taxes are levied change. In other words, there will be an automatic or mechanical change in the amount individuals pay in direct and indirect taxes even if the tax rates remain unchanged. Thus, the actual financing gap (i.e., the needed additional budgetary resources) equals the difference between the gross financing gap and the automatically induced change in the amount of taxes collected. The actual financing gap is equivalent to the change in taxes necessary to fund the additional transfer expenditures both under the UBI and the perfect targeting scenarios.

Budget neutrality is obtained by multiplying the existing tax rates in the baseline scenario by a constant multiplier that we endogenously calculate for each scenario. The existing tax rates are the observed direct tax incidence with respect to gross income and the indirect taxes with respect to disposable income for each individual.[36] While this rule will change ex post progressivity in the simulated scenarios, it is a simple and neutral manner to change taxes: everybody's taxes are increased proportionally. Note that with a new gross income in each simulated scenario, before taxes are adjusted to balance the budget, the actual concentration shares and progressivity of taxes with respect to gross income changes. It changes even if tax rates are kept constant because with alternative simulated scenarios –in the case of direct taxes--gross incomes change, and tax rates are applied to gross income. This is a "mechanical" or automatic change in the concentration shares and progressivity, and it would have happened even if tax rates were not adjusted. Our tax multiplier, however, assures that there is no additional change in the concentration shares or progressivity even after taxes are adjusted (usually upwards, but not always) to balance the budget.[37] The advantages of using this approach to achieve budget neutrality are twofold. First, it is easy to implement in practice. Second, it keeps the share of taxes paid by each individual constant (i.e., constant concentration shares of taxes) across scenarios.

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[35] The spending neutral scenario may also require an adjustment in taxes to be truly budget neutral. However, since the adjustment is bound to be small, in this paper we ignore this effect. While it may sound strange that a spending neutral scenario requires a change in taxes to keep it budget neutral, the fact is that when transfers are redistributed among beneficiaries, taxes paid change "mechanically" (in particular, consumption taxes). This change, however, may not be enough to make the UBI spending neutral also budget neutral in which case taxes will need to be adjusted (upwards or downwards).

[36] Implicitly, we are assuming that all of the gross income is taxable.

[37] The automatic adjustment in direct and indirect taxes is different from the simulated increase in direct or indirect taxes necessary to fill the financing gap. The automatic adjustment is "mechanical" as it results from the change in incomes in each simulated scenario. The simulated increase is equivalent to the additional necessary resources to fund the financing gap (when the gap is financed solely through direct taxes or indirect taxes). When the financing gap is funded through direct taxes, we impose the condition that gross incomes minus direct taxes paid cannot be less than zero. In some cases, this implies a limit on the amount of simulated direct taxes that can be collected from individuals in the microdata identified as taxpayers in the baseline. When that is the case, we then make a minor additional adjustment through indirect taxes required to get an identical total consumable income as in the baseline scenario, which guarantees our budget neutrality assumption.

The fact that a number of scenarios are not viable may be due to the measurement errors that affect the income and expenditure variables in household surveys (more on this below). Thus, for each of the simulated policies, we present two alternative fiscal options. In the first option, total subsidies and taxes are equal to what is obtained from the incomes captured in the survey. In the second, the total subsidies available (to be added to the transfers pool in the spending neutral scenario or to be used as a source of financing in the poverty gap and poverty line scenarios), and the taxes available to cover the financing gap equal the amounts reported in administrative accounts. Thus, in the second option, the change in tax burden to achieve budget neutrality will be lower. Also, specifically under the spending neutral scenario the generosity of the UBI transfer and the funds available for perfect targeting will be higher (recall that the size of the transfer does not depend on the amount from subsidies available in the poverty gap and poverty line scenarios). For simplicity, we call these the *lower bound* and the *upper bound* options in terms of resource availability. The lower bound is what results from using the total subsidies and taxes implied by the baseline fiscal incidence analyses. To calculate the upper bound we take into account *all* verified subsidies and tax revenues in administrative data.[38]

Table 3 presents the percentage that survey totals represents of verified administrative totals for subsidies, direct and indirect taxes. In all countries except for Ghana and Uganda (2012), the total (consumption) subsidies captured in the household survey as part of the fiscal incidence analyses are less than 100 percent of the verified subsidy expenditure in the budget and administrative documentation. In all countries, except for Ghana, direct and indirect taxes are less than 100 percent of verified revenue collections from those tax instruments. Based on this information, one can conclude that, in the upper bound option and for the spending neutral scenario, the average transfer will in general be higher (as shown in Table 4 in the Results section).[39] In the poverty gap and poverty line scenarios, the average transfer does not change under the upper bound. However, the resources available will be increased by both the difference between the taxes and subsidies in the administrative accounts and those captured by the survey. Thus, the tax burden will in general be lower.

[38] "Verified" expenditure or revenues in this case means only that the spending or revenues appear in budget reporting or other official documentation containing summaries of expenditures or revenue collections by state agencies or other bodies. There are fiscal items other than subsidies and revenues from direct and indirect taxes which may be part of a fiscal incidence analysis which are not allocated in full, but our concern in the simulations here extend to subsidy expenditure, direct cash transfer expenditure, and revenues from direct and indirect taxes which we can allocate to individuals.

[39] In the spending neutral scenario, the average transfer will be (roughly) the same in both options whenever there are no subsidies in the country (Comoros, eSwatini, Lesotho and South Africa) or the subsidies captured by the survey are very close to the administrative totals (Ghana and Uganda 2012).

Table 3. Factors of survey to administrative totals

Country	Year of Survey	Subsidies	Direct Taxes	Indirect Taxes
Botswana	2010	0.32	0.58	0.41
Comoros	2014	-	0.19	0.08
eSwatini	2017	-	0.31	0.31
Ghana	2013	1.00	1.00	0.66
Ivory Coast	2015	0.59	0.26	0.36
Lesotho	2017	-	0.88	0.67
Namibia	2010	0.43	0.38	0.40
Namibia	2015	0.54	0.46	0.48
South Africa	2010	-	0.89	0.61
South Africa	2015	-	0.40	0.49
Tanzania	2011	0.50	0.55	0.90
Togo	2015	0.05	0.31	0.96
Uganda	2012	1.00	0.75	0.71
Uganda	2016	0.85	0.93	0.52
Zambia	2015	0.25	0.66	0.23

Note:
The factor must be between 0 and 1. When a factor is bigger than 1 it is censored to 1.
Sources: Authors' calculations based on Botswana (Younger, 2020); Comoros (Belghith et al., 2017); eSwatini (Renda and Goldman, 2020); Ghana (Younger, Osei-Assibey and Oppong, 2016); Ivory Coast (Tassot and Jellema, 2019); Lesotho (Houts and Goldman, 2019); Namibia (Sulla, Zikhali and Jellema, 2016 and Jellema and Renda, 2020); South Africa (Inchauste et al., 2017 and Goldman, Woolard and Jellema, 2020); Tanzania (Younger, Myamba and Mdadila, 2016); Togo (Tassot and Jellema, 2018); Uganda (Jellema et al., 2016 and Mejia-Mantilla et al., 2020); and, Zambia (de la Fuente, Jellema and Rosales, 2018).

When not all verified expenditure(s) or revenue collections are allocated, we are assuming that the magnitude of incomes or transactions recorded in the survey is smaller than that *implicitly* recorded in the administrative documents. In other words, the survey economy is "smaller" than the economy represented in the budgetary or administrative documentation. The fact that the survey-based economy is "smaller" than that implied by administrative accounts can be due to measurement error (and other nonsampling errors) common in household surveys. In particular, household surveys suffer from undercoverage and underreporting especially in the upper tail.[40] Thus total income and expenditures in the microdata based on household surveys are usually lower than administrative totals and hence the implied total subsidies and total personal and consumption taxes captured by the survey are also lower than the administrative totals. As a result, total resources coming from subsidies that we are reallocating to transfers under the spending neutral scenario will be lower. In addition, the change in the tax burden to cover the financing gap (of the scenarios that require to raise taxes) will be higher than the "true" changes in tax burden. The latter happens because we are essentially asking the underreported incomes in the household surveys "to do all the work:" that is, to pay for the entire amount that taxes need to be raised by. That is why we call this option the lower bound. However, if the administrative figures for subsidies and taxes are correct, this means that there are extra resources

[40] For a survey, see Lustig (2019).

to fund both higher transfers and the required increase in revenues. Here we treat them as "manna from heaven" and require the incomes (households) captured by the survey to pay for the additional taxes only in the same proportion as the totals shown in Table 3. Hence, we call this gap financing option the upper bound.

In sum, to calculate the upper bound, we proceed as follows. For the spending neutral scenario, we first add the difference between administrative and survey-based total subsidies to the pool available to be converted into direct transfers. Doing this adjustment increases the average transfer per beneficiary of this scenario as shown in Table 4.[41] For the other two scenarios, the financing gap is calculated *after* adding the extra resources available in subsidies and tax revenues to those captured by the survey.

Table 4 shows the average transfer to the whole population (the UBI) and just to the poor population under the ten alternative scenarios and for the lower and upper bound options. For a UBI program, we consider six levels of generosity. Namely: the budget neutral UBI transfer is set equal to a) the poverty line for two poverty lines: the $1.90 and the country specific; b) the average poverty gap calculated based on the same two poverty lines; and c) the average current spending on cash transfers and consumption subsidies where the average is calculated with the lower and upper bound resources available (as defined above). By definition, the average transfer by country is the same for the universal and targeted poverty line and poverty gap scenarios. They vary only according to which poverty line is used to define the income floor: the $1.90 or the country specific. Their size is unaffected by whether we use the lower or upper bound of resources available. In contrast, the average transfer under the spending neutral scenario is directly affected by which option of available resources one uses since the amount from subsidies is higher in the administrative accounts for a number of countries as described above.

The average transfer under the poverty line scenario is –as expected--higher than in the baseline and the poverty gap scenario. The average transfer in the poverty gap scenario is higher than in the baseline in all countries except South Africa where the current system is relatively generous and quite propoor (the per capita transfer is inversely related to income). Under the spending neutral UBI scenario, the average transfer per poor person is lower than the baseline in Botswana, eSwatini, Lesotho, Namibia, and South Africa, and higher in the rest. The countries in which the transfer is lower than in the baseline are those in which consumption subsidies were not sufficiently large (or were nonexistent) to compensate for the fact that transfers are now spread among the entire population and not just the poor.[42] Recall that under a spending neutral scenario, the conversion of subsidies into a uniform transfer will make the use of these resources more progressive but the opposite happens with the existing targeted transfers. Regarding coverage, by definition, the coverage

[41] Just as in the lower bound option, we continue to make the assumption that there will be no adjustment in taxes in the spending neutral scenario (Table 2).

[42] Recall that subsidies are not uniform or propoor (progressive in absolute terms) so converting the subsidy resources into a uniform transfer will always help the poor while converting targeted (propoor) cash transfers into a uniform transfer will go in the opposite direction.

of the poor is 100 percent under any UBI scenario, and it is also 100 percent in the poverty gap and poverty line perfect targeting scenarios. The only scenario in which changes in coverage occur is under the perfect targeting spending neutral scenario and the pattern varies by country and poverty line, and whether we analyze the lower or upper bound option.

Table 4. Average Transfer under the Alternative Spending Scenarios (in daily US$ in PPP 2011)
Panel (a) $1.90 a Day International Poverty Line

Country	Year of Survey	Baseline		Poverty Line*	Poverty Gap*	Lower bound option			Upper bound option		
						Spending Neutral			Spending Neutral		
						Universal	Perfect targeting		Universal	Perfect targeting	
		Per poor person	Coverage of the poor (%)	Per poor person	Average per poor	Per capita	Per beneficiary	Coverage of the poor (%)	Per capita	Per beneficiary	Coverage of the poor (%)
Botswana	2010	0.53	92	1.90	0.75	0.40	0.75	100	0.52	0.75	100
Comoros	2014	-	-	1.90	0.55	-	-	-	-	-	-
eSwatini	2017	0.19	69	1.90	0.57	0.12	0.61	81	0.12	0.61	81
Ghana	2013	0.05	65	1.90	0.56	0.16	0.56	100	0.16	0.56	100
Ivory Coast	2015	0.01	37	1.90	0.58	0.02	0.36	24	0.03	0.40	37
Lesotho	2017	0.48	92	1.90	0.88	0.27	0.88	100	0.27	0.88	100
Namibia	2010	0.63	82	1.90	0.78	0.39	0.78	100	0.47	0.78	100
Namibia	2016	0.52	61	1.90	0.86	0.29	0.86	100	0.30	0.86	100
South Africa	2010	1.46	92	1.90	1.19	0.83	1.19	100	0.83	1.19	100
South Africa	2015	1.52	95	1.90	1.29	0.94	1.29	100	0.94	1.29	100
Tanzania	2011	0.02	78	1.90	0.60	0.03	0.25	27	0.06	0.30	37
Togo	2015	0.00	46	1.90	0.65	0.01	0.27	6	0.13	0.57	61
Uganda	2012	0.01	53	1.90	0.58	0.01	0.22	15	0.01	0.22	15
Uganda	2016	0.01	13	1.90	0.64	0.03	0.24	28	0.03	0.25	30
Zambia	2015	0.03	100	1.90	0.99	0.06	0.31	34	0.22	0.59	65

Panel (b) Country Specific International Poverty Lines

Country	Year of Survey	Baseline		Poverty Line*	Poverty Gap*	Lower bound option			Upper bound option		
						Spending Neutral			Spending Neutral		
						Universal	Perfect targeting		Universal	Perfect targeting	
		Per poor person	Coverage of the poor (%)	Per poor person	Average per poor	Per capita	Per beneficiary	Coverage of the poor (%)	Per capita	Per beneficiary	Coverage of the poor (%)
Botswana	2010	0.41	87	5.50	2.96	0.40	1.20	57	0.52	1.35	66
Comoros	2014	-	-	1.90	0.55	-	-	-	-	-	-
eSwatini	2017	0.16	63	3.20	1.31	0.12	0.61	41	0.12	0.61	41
Ghana	2013	0.06	68	3.20	1.07	0.16	0.86	63	0.16	0.86	63
Ivory Coast	2015	0.01	44	3.20	1.21	0.02	0.36	11	0.03	0.40	16
Lesotho	2017	0.39	86	3.20	1.62	0.27	0.84	63	0.27	0.84	63
Namibia	2010	0.45	75	5.50	3.23	0.39	1.01	56	0.47	1.23	56
Namibia	2016	0.37	50	5.50	2.89	0.29	1.13	47	0.30	1.14	49
South Africa	2010	1.16	81	5.50	3.61	0.83	2.10	69	0.83	2.10	69
South Africa	2015	1.24	86	5.50	3.77	0.94	1.79	85	0.94	1.79	85
Tanzania	2011	0.02	78	1.90	0.60	0.03	0.25	27	0.06	0.30	37
Togo	2015	0.00	46	1.90	0.65	0.01	0.27	6	0.13	0.57	61
Uganda	2012	0.01	53	1.90	0.58	0.01	0.22	15	0.01	0.22	15
Uganda	2016	0.01	13	1.90	0.64	0.03	0.24	28	0.03	0.25	30
Zambia	2015	0.03	100	3.20	1.95	0.06	0.31	27	0.22	0.59	51

Notes:

Country specific poverty lines are: Comoros, Tanzania, Togo and Uganda: $1.90 a day international poverty line. eSwatini, Ghana, Ivory Coast, Lesotho and Zambia: $3.20 a day international poverty line. Botswana, Namibia and South Africa: $5.50 a day poverty line.

Comoros does not have transfers or subsidies and hence average transfer are zero in the baseline and the spending neutral scenarios.

*The average transfer per poor person under perfect targeting and per capita under UBI are identical by construction both for the poverty gap and the poverty line scenarios; hence we report the information only once.

Source: Authors' calculations based on Botswana (Younger, 2020); Comoros (Belghith et al., 2017); eSwatini (Renda and Goldman, 2020); Ghana (Younger, Osei-Assibey and Oppong, 2016); Ivory Coast (Tassot and Jellema, 2019); Lesotho (Houts and Goldman, 2019); Namibia (Sulla, Zikhali and Jellema, 2016 and Jellema and Renda, 2020); South Africa (Inchauste et al., 2017 and Goldman, Woolard and Jellema, 2020); Tanzania (Younger, Myamba and Mdadila, 2016); Togo (Tassot and Jellema, 2018); Uganda (Jellema et al., 2016 and Mejia-Mantilla et al., 2020); and, Zambia (de la Fuente, Jellema and Rosales, 2018).

In order to address the key question in this paper, for each budget neutral UBI and targeted scenario, we calculate the poverty and tax burden indicators so that we can compare them with the baseline and each other. The next section describes the results of this comparison.

IV. **Results**[43]

Are budget neutral income floors fiscally viable in the twelve SSA countries analyzed here? To respond to this question, we will assess the extent to which a UBI program is viable for six levels of generosity. Namely, the budget neutral UBI transfer is set equal to: a) the poverty line for the $1.90 and the country specific poverty lines; b) the average poverty gap calculated based on the same two poverty lines; and, c) the average current spending on cash transfers and consumption subsidies where the average is calculated with the lower and upper bound resources available (as defined in the previous section). We will also analyze the viability of targeted programs under the same levels of generosity.

Recall that we defined a policy scenario as viable if four conditions are met: postfiscal poverty (measured with consumable income) is not higher than prefiscal poverty using the headcount ratio and the squared poverty gap as indicators; the postfiscal squared poverty gap (measured with consumable income) is equal or lower under a simulated program than in the baseline; the policy option is feasible (that is, no negative consumable incomes and no extreme reranking); and, the policy option implies an increase in the average tax rate of each decile below 10 percent. To assess the sensitivity of our results to this tax threshold, we repeated the exercise allowing different changes in average tax rates. We found that the number of viable cases changes relatively little even if the threshold is raised to 25 percent.[44]

[43] Results for the simulations under the lower bound option presented in this paper for a subset of the twelve countries are based on Lustig, Jellema and Martinez Pabon (2019). In this version, we added Botswana, eSwatini, Lesotho, Namibia (2016), South Africa (2015), and Uganda (2016).

[44] While not shown here, we have also explored how the number of viable scenarios changes when we lower or raise the allowed increase in tax rates. The number of viable cases changes relatively little as the threshold changes between 5, 20 and 25 percent. In this paper, we do not consider efficiency implications (e.g., on labor supply decisions) associated with a UBI per se (that is, regardless of the tax implications).

IV.a Are Scenarios Viable?

We analyze the overarching question by scenario for the two poverty lines, the two sources of financing (direct or indirect taxes) when applicable, and for the lower and upper bounds in resources. Results are shown in Tables 5 and 6.

Table 5. Viable Scenarios at $1.90 a day International Poverty Line

Panel (a) Lower bound option

Country	Year of Survey	Poverty Line				Poverty Gap				Spending Neutral	
		UBI		Targeted		UBI		Targeted		UBI	Perfect targeting
		DT	IT	DT	IT	DT	IT	DT	IT		
Botswana	2010	No	No	**Yes**	**Yes**	No	No	No	No	**Yes**	No
Comoros	2014	No	No	No	No	No	No	No	No	-	-
Eswatini	2017	No	No	No	No	No	No	No	No	No	No
Ghana	2013	No	No	**Yes**	**Yes**	No	No	No	No	No	No
Ivory Coast	2015	No	No	No	No	No	No	No	No	No	No
Lesotho	2017	No	No	No	No	No	No	No	No	No	No
Namibia	2010	No	No	No	No	No	No	No	No	No	No
Namibia	2016	No	No	**Yes**	**Yes**	No	No	No	No	No	No
South Africa	2010	No	No	No	**Yes**	No	No	No	No	No	No
South Africa	2015	No	No	No	**Yes**	No	No	No	No	No	No
Tanzania	2011	No	No	No	No	No	No	No	No	No	No
Togo	2015	No	No	No	No	No	No	No	No	No	No
Uganda	2012	No	No	No	No	No	No	No	No	No	No
Uganda	2016	No	No	No	No	No	No	No	No	No	No
Zambia	2015	No	No	No	No	No	No	No	No	No	No

Panel (b) Upper bound option

Country	Year of Survey	Poverty Line				Poverty Gap				Spending Neutral	
		UBI		Targeted		UBI		Targeted		UBI	Perfect targeting
		DT	IT	DT	IT	DT	IT	DT	IT		
Botswana	2010	No	No	**Yes**	**Yes**	No	No	No	No	**Yes**	No
Comoros	2014	No	No	No	No	No	No	No	No	No	No
Eswatini	2017	No	No	No	No	No	No	No	No	No	No
Ghana	2013	No	No	**Yes**	**Yes**	No	No	No	No	**Yes**	No
Ivory Coast	2015	No	No	No	No	No	No	No	No	No	No
Lesotho	2017	No	No	No	No	No	No	No	No	No	No
Namibia	2010	No	No	No	No	No	No	No	No	No	No
Namibia	2016	No	No	**Yes**	**Yes**	No	No	No	No	No	No
South Africa	2010	No	No	No	**Yes**	No	No	No	No	No	No
South Africa	2015	No	No	No	**Yes**	No	No	No	No	No	No
Tanzania	2011	No	No	No	No	No	No	No	No	No	No
Togo	2015	No	No	No	No	No	No	No	No	No	No
Uganda	2012	No	No	No	No	No	No	No	No	No	No
Uganda	2016	No	No	No	No	No	No	No	No	No	No
Zambia	2015	No	No	No	No	No	No	No	No	**Yes**	No

Notes:

A policy scenario is viable if four conditions are met: (i) the fiscal system is not poverty increasing; (ii) the squared poverty gap measured with consumable income of the policy scenario is not worse than under the baseline; (iii) the required increase in taxes under the policy scenario would not yield nonsensical results: i.e., turn consumable income negative and extreme reranking; (iv) the required increase in the average tax incidence of each decile is for it to be below 10 percent.

Comoros does not have transfers or subsidies and hence the spending neutral scenario does not apply.

Source: Authors' calculations based on Botswana (Younger, 2020); Comoros (Belghith et al., 2017); Ghana (Younger, Osei-Assibey and Oppong, 2016); eSwatini (Renda and Goldman, 2020); Ivory

Coast (Tassot and Jellema, 2019); Lesotho (Houts and Goldman, 2019); Namibia (Sulla, Zikhali and Jellema, 2016 and Jellema and Renda, 2020); South Africa (Inchauste et al., 2017 and Goldman, Woolard and Jellema, 2020); Tanzania (Younger, Myamba and Mdadila, 2016); Togo (Tassot and Jellema, 2018); Uganda (Jellema et al., 2016 and Mejia-Mantilla et al., 2020); and, Zambia (de la Fuente, Jellema and Rosales, 2018).

Table 6. Viable Scenarios at Country Specific International Poverty Lines

Panel (a) Lower bound option

Country	Year of Survey	Poverty Line				Poverty Gap				Spending Neutral	
		UBI		Targeted		UBI		Targeted		UBI	Perfect targeting
		DT	IT	DT	IT	DT	IT	DT	IT		
Botswana	2010	No	No	No	No	No	No	No	No	No	No
Comoros	2014	No	No	No	No	No	No	No	No	-	-
Eswatini	2017	No	No	No	No	No	No	No	No	No	No
Ghana	2013	No	No	No	No	No	No	No	No	No	No
Ivory Coast	2015	No	No	No	No	No	No	No	No	No	No
Lesotho	2017	No	No	No	No	No	No	No	No	No	No
Namibia	2010	No	No	No	No	No	No	No	No	No	No
Namibia	2016	No	No	No	No	No	No	No	No	No	No
South Africa	2010	No	No	No	No	No	No	No	No	No	No
South Africa	2015	No	No	No	No	No	No	No	No	No	No
Tanzania	2011	No	No	No	No	No	No	No	No	No	No
Togo	2015	No	No	No	No	No	No	No	No	No	No
Uganda	2012	No	No	No	No	No	No	No	No	No	No
Uganda	2016	No	No	No	No	No	No	No	No	No	No
Zambia	2015	No	No	No	No	No	No	No	No	No	No

Panel (b) Upper bound option

Country	Year of Survey	Poverty Line				Poverty Gap				Spending Neutral	
		UBI		Targeted		UBI		Targeted		UBI	Perfect targeting
		DT	IT	DT	IT	DT	IT	DT	IT		
Botswana	2010	No	No	No	No	No	No	No	No	**Yes**	No
Comoros	2014	No	No	No	No	No	No	No	No	-	-
Eswatini	2017	No	No	No	No	No	No	No	No	No	No
Ghana	2013	No	No	No	No	No	No	No	No	No	No
Ivory Coast	2015	No	No	No	No	No	No	No	No	No	No
Lesotho	2017	No	No	No	No	No	No	No	No	No	No
Namibia	2010	No	No	No	No	No	No	No	No	No	No
Namibia	2016	No	No	No	No	No	No	No	No	No	No
South Africa	2010	No	No	No	No	No	No	No	No	No	No
South Africa	2015	No	No	No	No	No	No	No	No	No	No
Tanzania	2011	No	No	No	No	No	No	No	No	No	No
Togo	2015	No	No	No	No	No	No	No	No	No	No
Uganda	2012	No	No	No	No	No	No	No	No	No	No
Uganda	2016	No	No	No	No	No	No	No	No	No	No
Zambia	2015	No	No	No	No	No	No	No	No	**Yes**	No

Notes:

A policy scenario is viable if four conditions are met: (i) the fiscal system is not poverty increasing; (ii) the squared poverty gap measured with consumable income of the policy scenario is not worse than under the baseline; (iii) the required increase in taxes under the policy scenario would not yield nonsensical results: i.e., turn consumable income negative and extreme reranking; (iv) the required increase in the average tax incidence of each decile is for it to be below 10 percent.

Country specific poverty lines are: Comoros, Tanzania, Togo and Uganda: $1.90 a day international poverty line. eSwatini, Ghana, Ivory Coast, Lesotho and Zambia: $3.20 a day international poverty line. Botswana, Namibia and South Africa: $5.50 a day poverty line.
Comoros does not have transfers or subsidies and hence the spending neutral scenario does not apply.
Source: Authors' calculations based on Botswana (Younger, 2020); Comoros (Belghith et al., 2017); Ghana (Younger, Osei-Assibey and Oppong, 2016); eSwatini (Renda and Goldman, 2020); Ivory Coast (Tassot and Jellema, 2019); Lesotho (Houts and Goldman, 2019); Namibia (Sulla, Zikhali and Jellema, 2016 and Jellema and Renda, 2020); South Africa (Inchauste et al., 2017 and Goldman, Woolard and Jellema, 2020); Tanzania (Younger, Myamba and Mdadila, 2016); Togo (Tassot and Jellema, 2018); Uganda (Jellema et al., 2016 and Mejia-Mantilla et al., 2020); and, Zambia (de la Fuente, Jellema and Rosales, 2018).

Poverty Line Scenario

While as expected the two poverty conditions were met throughout, making universal transfers equal to the poverty line entailed too large an increase in taxes to make it a viable policy option. As we see in Tables 5 and 6, a budget neutral UBI equal to the poverty line (US$1.90 or country specific poverty line) is never viable. This occurs even if we consider the additional resources (upper bound option; panel b in Tables 5 and 6).

What about if we consider a targeted poverty line transfer? As shown, this policy alternative appears viable in Botswana, Ghana, and Namibia (2016), financed by either direct or indirect taxes, and whether we consider or not additional resources, but only for the lower US$1.90 poverty line. In South Africa, the policy alternative is only viable if financed by indirect taxes. With the country specific poverty line, no case is viable.

In sum, a universal income floor equal to the poverty line implies an increase in taxes that is too large to make such an option viable. However, Botswana, Ghana, Namibia (2016) and South Africa could increase the generosity of their transfers significantly as long as they are targeted to the poor. This can be seen if we compare the baseline average transfers to the poor with the $1.90 poverty line scenario shown in Table 4.

Poverty Gap Scenario

What happens if we lower the generosity of the transfer to equal the average poverty gap instead of the poverty line? A budget neutral poverty gap UBI meets the two poverty conditions in a number of cases depending on the poverty line, the source of funding, and the resources available.[45] For

[45] For the $1.90 poverty line and lower bound option: 6 cases with direct taxes and 10 with indirect taxes. Under the upper bound option, the latter increases to 13. For the country specific poverty line: 2 cases with direct taxes and 11 with indirect taxes. Under the upper bound option, these rise to 5 and 15.

brevity, these are shown in the Statistical Annex. Once we add the tax-related conditions, however, the number of viable cases shrinks to zero.

With perfect targeting, the first poverty condition is never met under the poverty gap scenario because since resources are transferred based on each person's poverty gap measured with prefiscal income, some individuals who are not poor in the prefiscal situation become poor in the postfiscal situation as a result of the required increase in taxes. However, if one relaxes the condition that the postfiscal headcount ratio should not be higher than the prefiscal one and focuses instead on ensuring that this condition is fulfilled for the squared poverty gap, all targeted scenarios fulfill the two poverty conditions if the financing source are indirect taxes and for the two poverty lines. With direct taxes, all targeted scenarios for the US$1.90 poverty line become viable except for Tanzania, Togo, and Uganda (2016). With the country specific poverty lines, in addition to these two, Botswana and Ivory Coast become viable.

In sum, just as with the poverty line scenario, a universal income floor equal to the poverty gap implies an increase in taxes that is too large to make such an option viable. In addition, as long as one is willing to accept that the postfiscal headcount ratio could be higher than the prefiscal one, a highly progressive targeted poverty gap transfer (perfect targeting is the most progressive option) is viable in several countries and could reduce poverty through fiscal redistribution by more than in the baseline. In real life policy settings, there could be combinations of targeting and additional tax revenues in which, while the prefiscal poverty gap is not eliminated for the poorest, the outcome could result in both a lower postreform headcount ratio and squared poverty gap (but the latter would not be as low as in the perfect targeting case, of course).

Spending Neutral Scenario

We now turn to the spending neutral where no increase in taxes is required because the simulated transfer program is funded with current spending on transfers and subsidies. A spending neutral UBI for the US$1.90 poverty line and the lower bound option meets the two poverty conditions in Botswana; Ghana and Zambia are added to the list under the upper bound option. For the country specific poverty lines and the lower bound option, no case fulfills the two poverty conditions. Under the upper bound option, only Botswana and Zambia met the conditions. If one is willing to relax the condition that the postfiscal headcount ratio should not rise as long as the postfiscal squared poverty gap falls, then in Botwana, Ghana, Togo, and Zambia a spending neutral UBI is viable under the upper bound option.

Similar as to the perfect targeting poverty gap scenario, with perfectly targeted transfers under the spending neutral scenario, the first poverty condition is never met because resources are exhausted before reaching the poor who are closer to the poverty line. If one relaxes this condition and allows for the headcount ratio to rise as long as the squared poverty gap decline, except for South Africa

(2015), the rest of the cases (and for both poverty lines) fulfill the two poverty conditions under the upper bound option.[46]

In sum, a UBI scenario is not viable either under the poverty line or poverty gap generosity levels because of the required increase in taxes. This is the case even with the lower poverty line or the upper bound in available resources. With a less generous transfer such as the one that corresponds to the spending neutral scenario, a UBI becomes viable in Botswana and, when we consider the upper bound of resources, in Ghana and Zambia. As expected, the upper middle-income Botswana, Namibia and South Africa could introduce targeted income floors for the poor but just for the $1.90 poverty line. Ghana could also introduce a $1.90 targeted income floor. In other words, in these four countries, the generosity of targeted transfers could, in principle, be increased if the short-term poverty outcomes were our sole concern.

IV.b Impact on Poverty

In Table 7, we present the poverty impact results for the viable scenarios only.[47] By definition, given our poverty conditions, all cases shown here will feature a larger poverty reduction (or, at least no worse) than in the baseline. With even the lower bound of resources available, Botswana could explore implementing a UBI where the transfer equals the average total spending on targeted transfers and subsidies and do better in terms of poverty reduction than the baseline but only marginally so. However, when one compares the poverty impact of a UBI with the targeted scenarios, it is evident what is lost in terms of the poverty-reducing power: the squared poverty gap index could be practically eliminated under the targeted options. It is interesting to note that the poverty effects under all the considered scenarios are very similar whether one relies on direct or indirect taxes to cover the financing gap (when it applies).

Under the upper bound option, a UBI equal to current spending on transfers and subsidies (the spending neutral scenario) yields better poverty outcomes for Botswana, Ghana and Zambia for the $1.90 poverty line. That is, making available all what is spent based on administrative totals on subsidies to be added to transfers and converted into a UBI yields significantly better poverty-reducing outcomes. With the country specific poverty line, the spending neutral scenario is viable for Botswana and Zambia, and the poverty outcomes, while still better than in the baseline, are smaller. We can see again, however, how a UBI tempers the poverty reducing effects when compared to targeted scenarios.

Although no UBI scenario is viable in Namibia (2016) and South Africa, the targeted poverty line scenario could significantly reduce the headcount ratio and the squared poverty gap index. In the case of Namibia (2016), the impact on poverty is very similar if either direct or indirect taxes fund the financing gap.

[46] Comoros does not have transfers or subsidies and hence the spending neutral scenario does not apply.
[47] The poverty results for all countries and all scenarios are in the Statistical Annex.

Table 7. Change in the Headcount Ratio and the Squared Poverty Gap Between Prefiscal and Postfiscal Income for Baseline and Viable Simulated Scenarios (in %)

Country	Year of Survey	$1.90 a day International Poverty Line							Country Specific Poverty Lines	
		Baseline	Lower bound			Upper bound			Baseline	Upper bound
			Poverty Line		Spending Neutral	Poverty Line		Spending Neutral		Spending Neutral
			Targeted		UBI	Targeted		UBI		UBI
			DT	IT		DT	IT			
Headcount Ratio										
Botswana	2010	-13.4	-87.1	-86.9	-19.3	-87.8	-87.6	-28.6	1.5	-0.8
Ghana	2013	12.7	-79.0	-78.9		-79.0	-79.1	-1.8		
Namibia	2010	-15.6								
Namibia	2016	-10.0	-77.7	-75.7		-77.1	-77.4			
South Africa	2010	-40.8		-58.6			-57.6			
South Africa	2015	-35.6		-45.4			-43.4			
Zambia	2015	0.8						-5.2	0.9	-0.7
Squared Poverty Gap										
Botswana	2010	-43.8	-98.2	-98.3	-45.9	-98.7	-98.5	-59.0	-11.3	-19.3
Ghana	2013	7.9	-98.5	-98.7		-98.5	-98.7	-19.1		
Namibia	2010	-56.9								
Namibia	2016	-46.8	-99.7	-99.7		-99.7	-99.7			
South Africa	2010	-83.3		-91.0			-90.9			
South Africa	2015	-79.1		-94.0			-93.2			
Zambia	2015	-0.6						-29.5	0.5	-15.6

Notes:

Country specific poverty lines are: Comoros, Tanzania, Togo and Uganda: $1.90 a day international poverty line. eSwatini, Ghana, Ivory Coast, Lesotho and Zambia: $3.20 a day international poverty line. Botswana, Namibia and South Africa: $5.50 a day poverty line.

Source: Authors' calculations based on Botswana (Younger, 2020); Comoros (Belghith et al., 2017); Ghana (Younger, Osei-Assibey and Oppong, 2016); eSwatini (Renda and Goldman, 2020); Ivory Coast (Tassot and Jellema, 2019); Lesotho (Houts and Goldman, 2019); Namibia (Sulla, Zikhali and Jellema, 2016 and Jellema and Renda, 2020); South Africa (Inchauste et al., 2017 and Goldman, Woolard and Jellema, 2020); Tanzania (Younger, Myamba and Mdadila, 2016); Togo (Tassot and Jellema, 2018); Uganda (Jellema et al., 2016 and Mejia-Mantilla et al., 2020); and, Zambia (de la Fuente, Jellema and Rosales, 2018).

Our paper noted that some of the baseline fiscal systems produce the undesirable result that the postfiscal headcount ratio and/or the squared poverty gap index (measured with consumable income and with the $1.90 and country specific poverty lines) are higher than the prefiscal ones suggesting that the existing fiscal system is poverty increasing. This was found for Comoros (low income), Ghana (lower middle income), Ivory Coast (lower middle income), Tanzania (low income), Togo (low income), Uganda (low income) and Zambia (lower middle income).[48] Our results show that in Ghana and Zambia, the poverty increasing characteristic found in the baseline scenario could be eliminated with a spending neutral UBI but only under the upper bound option.

[48] See the Statistical Annex.

None of the scenarios examined here—whether universal or targeted and even with the lower poverty line and the upper bound in resource availability—would eliminate fiscal impoverishment in Comoros, Ivory Coast, Tanzania, Togo, and Uganda.[49] In the low-income countries Comoros, Tanzania, Togo, and Uganda, it would be very hard to fund a UBI or even a targeted transfer system for the population living in poverty without making a portion of the poor net payers. While not fully eliminated, however, fiscal impoverishment is less under the spending neutral UBI than in the baseline in Ivory Coast, Tanzania, Togo, and Uganda.

IV.c Impact on Tax Burdens

In Table 8, we show the average tax rate (aka the average tax incidence) by decile for the baseline and each of the targeted poverty line viable scenarios. These targeted scenarios are viable, as shown in Tables 5 and 6 above, in Botswana, Ghana, Namibia (2016), and South Africa (both years) but only for the $1.90 poverty line. Recall two important aspects of our previously discussed results. By assumption, the spending neutral scenarios do not imply a change in the average tax rates, so they are not shown in Table 8. No poverty gap scenario, whether UBI or targeted, and no UBI poverty line scenario are viable, so they are not shown in Table 8 either.

The impact on tax burdens is assessed by the difference in the incidence of taxes paid by each decile between the analyzed scenario and the baseline. Recall that the incidence here is defined as the ratio of total direct and indirect taxes to gross income plus subsidies (extended gross income in Figure 1). In the targeted poverty line scenario, the numerator includes both the mechanical and the additional required tax to fund the financing gap; the denominator is the extended gross income that results from adding a transfer equal to the poverty line to the prefiscal income for individuals with prefiscal income below the corresponding poverty line. Recall that for the upper bound option, the baseline incidence is affected by higher resources from subsidies in the extended gross income (denominator), and the incidence for the scenario is affected by lower additional required taxes to fund the financing gap (numerator).

Under the lower bound option, in Botswana, Ghana, and Namibia, the increase in the average tax rate is 0.3 to 4.9, 1.1 to 6.5, and 0.3 to 5.3 percent if the financing gap is covered with direct taxes. If financed by indirect taxes, the figures are 0.8 to 5.4, 3.2 to 6.8, and 2.8 to 9.3 percent, respectively. When either direct or indirect taxes finance a targeted poverty line transfer, the increase in the tax burden seems to be feasible economically. For the upper bound option, the increase in the tax burden is, in general, lower.

In South Africa, for this scenario we observe that the incidence of total taxes with respect to the extended gross income decreases compared to the baseline. This is explained by the fact that the total amount transferred under the the scenario is lower than the one transferred in the baseline, and that

[49] The specific results can be found in the Statistical Annex.

the total mechanical taxes (direct and indirect) in the scenario are higher than in the baseline. As a result, the required adjustment in taxes works as a tax refund and total incidence in the targeted poverty line scenario—the only viable one-- ends up being lower than in the baseline.

Table 8. Incidence of Total Taxes (Direct and Indirect) with respect to Extended Gross Income for Baseline and Viable Simulated Scenarios (in %); $1.90 a day International Poverty Line; Viable Scenarios

Panel (a) Lower bound option

Decile	Botswana (2010)			Ghana (2013)			Namibia (2016)			South Africa (2010)			South Africa (2015)		
	Baseline	Poverty Line Targeted		Baseline	Poverty Line Targeted		Baseline	Poverty Line Targeted		Baseline	Poverty Line Targeted		Baseline	Poverty Line Targeted	
		DT	IT		DT	IT		DT	IT		DT	IT		DT	IT
1	5.6	5.9	5.9	6.4	6.5	6.6	8.2	8.7	9.0	7.6		7.9	9.8		8.5
2	5.8	5.9	6.0	6.9	7.1	7.4	9.1	9.2	9.6	10.9		10.4	14.5		14.3
3	6.6	6.6	6.7	7.1	7.3	7.6	9.1	9.2	9.9	10.7		9.9	14.9		13.9
4	6.4	6.5	6.6	7.3	7.5	7.7	9.3	9.3	10.1	11.0		9.6	15.3		13.7
5	6.4	6.5	6.6	7.6	7.8	8.1	9.4	9.4	10.1	12.1		10.6	15.8		13.6
6	7.2	7.2	7.3	8.2	8.6	8.8	9.5	9.6	10.2	13.4		12.0	17.1		15.0
7	7.4	7.6	7.6	8.8	9.2	9.3	10.2	10.4	10.9	16.0		14.8	18.0		16.0
8	8.8	9.0	9.0	9.4	9.9	10.0	11.8	12.0	12.4	19.7		18.5	20.6		18.7
9	11.0	11.2	11.2	10.4	10.9	11.0	13.8	14.3	14.5	25.9		24.7	23.7		22.1
10	13.2	13.4	13.3	14.4	15.4	15.1	18.5	19.4	19.0	36.6		35.6	27.9		26.5
Total	10.8	10.9	10.9	10.6	11.1	11.1	14.9	15.4	15.4	29.2		28.2	24.1		22.7

Panel (b) Upper bound option

Decile	Botswana (2010)			Ghana (2013)			Namibia (2016)			South Africa (2010)			South Africa (2015)		
	Baseline	Poverty Line Targeted		Baseline	Poverty Line Targeted		Baseline	Poverty Line Targeted		Baseline	Poverty Line Targeted		Baseline	Poverty Line Targeted	
		DT	IT		DT	IT		DT	IT		DT	IT		DT	IT
1	5.6	5.6	5.7	6.4	6.5	6.6	8.1	8.8	8.8	7.6		8.3	9.8		9.3
2	5.8	5.7	5.7	6.9	7.1	7.2	9.0	9.4	9.3	10.9		10.7	14.5		14.9
3	6.5	6.0	6.2	7.1	7.3	7.4	9.1	9.5	9.5	10.7		10.3	14.9		14.6
4	6.3	5.9	6.0	7.3	7.5	7.6	9.3	9.7	9.6	11.0		10.1	15.3		14.6
5	6.3	5.9	6.0	7.6	7.8	8.0	9.3	9.7	9.7	12.1		11.2	15.8		14.9
6	7.0	6.6	6.7	8.2	8.6	8.6	9.5	9.9	9.8	13.4		12.5	17.1		16.1
7	7.3	6.8	7.1	8.8	9.2	9.2	10.2	10.6	10.5	16.0		15.3	18.0		17.1
8	8.7	8.0	8.5	9.4	9.9	9.9	11.7	12.2	12.0	19.7		18.9	20.6		19.7
9	10.8	9.9	10.7	10.4	10.9	10.8	13.8	14.3	14.1	25.9		25.2	23.7		23.0
10	13.1	11.8	12.8	14.4	15.4	15.0	18.5	19.1	18.7	36.6		36.0	27.9		27.2
Total	10.7	9.7	10.4	10.6	11.1	10.9	14.9	15.3	15.1	29.2		28.7	24.1		23.5

Notes: The incidence of total taxes is the ratio of total direct and indirect taxes to extended gross income which adds subsidies to the standard gross income concept as shown in Figure 1.

Source: Authors' calculations based on Botswana (Younger, 2020); Comoros (Belghith et al., 2017); Ghana (Younger, Osei-Assibey and Oppong, 2016); eSwatini (Renda and Goldman, 2020); Ivory Coast (Tassot and Jellema, 2019); Lesotho (Houts and Goldman, 2019); Namibia (Sulla, Zikhali and Jellema, 2016 and Jellema and Renda, 2020); South Africa (Inchauste et al., 2017 and Goldman, Woolard and Jellema, 2020); Tanzania (Younger, Myamba and Mdadila, 2016); Togo (Tassot and Jellema, 2018); Uganda (Jellema et al., 2016 and Mejia-Mantilla et al., 2020); and, Zambia (de la Fuente, Jellema and Rosales, 2018).

V. Conclusions

Are budget neutral universal income floors fiscally viable in the twelve SSA countries analyzed here? The general response is no. Except in strikingly few cases, UBI programs would not be viable. Let us start with the poverty line scenario. While by construction the two poverty conditions are met throughout, making transfers universal and equal to even the lower $1.90 poverty line entails too large increases in average tax rates to make it a viable policy option. Recall that one would need to raise additional resources equivalent to the poverty line multiplied by the total population minus current spending on transfers and subsidies (lower bound option) and minus the additional revenues captured in administrative accounts (upper bound).

If we lower the generosity of the transfer and make it equal to the average poverty gap, a budget neutral UBI meets the two poverty conditions in a number of cases depending on the poverty line, the source of funding, and the resources available. Once we add the tax-related conditions, however, there are no viable cases. Recall that --while lower-- than under the poverty line scenario, the additional resources would still need to be quite high. They are equivalent to the average poverty gap multiplied by the total population minus current spending on transfers and subsidies (lower bound) and minus the additional revenues captured in administrative accounts (upper bound). Just as with the poverty line scenario, a universal income floor equal to the poverty gap implies an increase in taxes that is too large to make such an option viable.

Let us consider the spending neutral UBI. Recall that no increase in taxes is required because the simulated transfer program is funded with current spending on transfers and subsidies. A spending neutral UBI for the US$1.90 poverty line and the lower bound option meets the two poverty conditions in Botswana; Ghana and Zambia are added to the list under the upper bound option. For the country specific poverty lines and the lower bound option, no case fulfills the two poverty conditions. Under the upper bound option, only Botswana and Zambia meet the conditions.

A UBI has the advantage that everyone achieves the income floor at all times. A UBI might be preferred over a targeted system especially when households move in and out of poverty with frequency and to help households cope with systemic shocks, especially in countries with little or no formal social protection programs. The onset of the COVID-19 pandemic reminded us how important a safety net with a wide coverage of the population is. But a budget neutral UBI, as results here show, entails too large an increase in taxes to make it a viable policy option in general. Thus, targeted transfers appear to be a superior policy alternative. However, targeting is not without its problems. As discussed by Brown, Ravallion, and van de Walle (2016), identifying precisely who is and is not poor remains complicated due to unreliable data, weak information systems, and a lack of administrative capacity in poor countries while Desai and Kharas (2017) discuss the political difficulties inherent in targeting. That is to say, implementing a reasonably well-targeted transfer program could be expensive or not feasible even when revenues for the transfers themselves can be feasibly raised.

While we considered an upper bound of available resources, we did this based on administrative data. In addition, as indicated by Moore, Prichard, and Fjeldstad (2018), there are potentially a whole series of additional revenues that could be tapped by adequately taxing the personal incomes of wealthy people or their property ownership; reducing tax exemptions to investors; curbing corruption in tax collection; proper taxing of mining; increasing excise taxes on tobacco and alcohol; reducing 'leaks" in VAT collection; and introducing gross turnover or excise taxes to compensate for taxes lost as a result of transnational companies shifting profits overseas.[52] Revenues from these "other" sources could potentially increase the domestic resources available for providing an adequate income floor. It remains to be seen whether (and if) increasing revenues through these channels would change our results in any significant manner. This is left for future research.

[52] Moore, Prichard, and Fjeldstad (2018) estimate the revenue lost due to base erosion and profit shifting *alone* in developing countries can range between 1 and 2 percent of GDP.

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