The Short-run Impact of the COVID-19 Crisis on Poverty in Ethiopia

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and *Seyoum Taffesse*

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Bringing Rigour and Evidence to Economic Policy Making in Africa

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Abstract

A significant fraction of recently surveyed Ethiopian rural and urban households report income losses related to the COVID-19 pandemic. This study estimates how large these income losses are likely to be and the consequent impact on the poverty status of households. It finds that both the poverty headcount ratio and the poverty gap could increase significantly.

1. Introduction

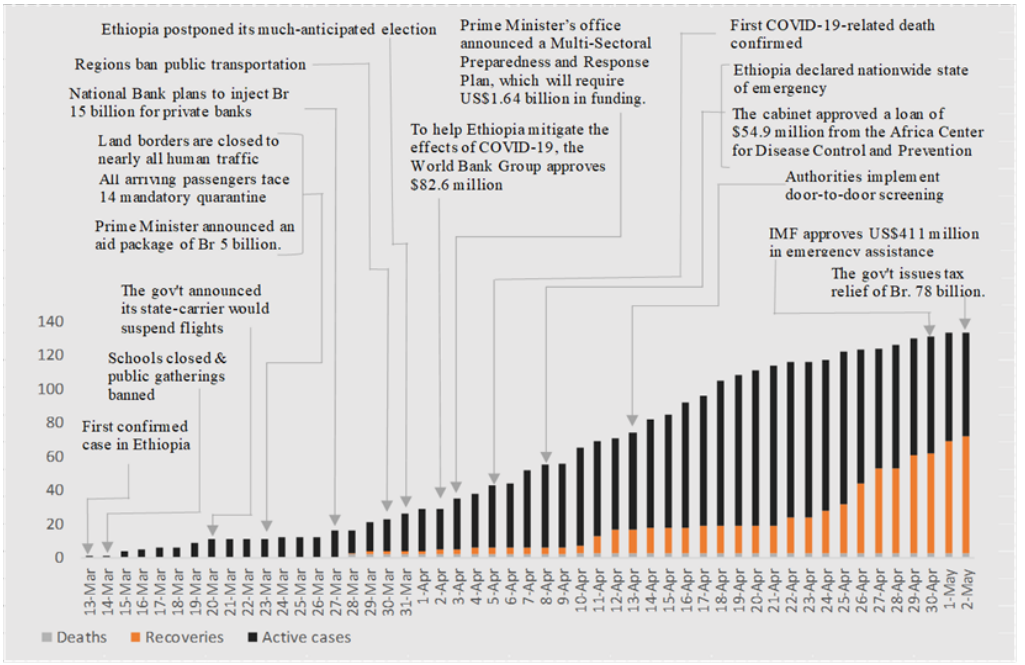
As COVID-19 spread rapidly across countries, leaders scrambled to take appropriate actions in response, initially based on limited knowledge about the nature of the virus. A reaction common to many countries was to impose a complete lockdown. It became quickly apparent that such lockdowns translated into a considerable economic slowdown leading to unemployment and loss of income for a large fraction of the population. These unintended consequences of the lockdown forced governments to introduce measures such as expanding the coverage of food voucher schemes, direct cash transfers to individuals, support to businesses, and injection of money into the financial markets, all aimed at dampening the detrimental impact on economic activity and food security. In March 2020, 45 countries – in North America, Australia, and some countries in South America and East Asia including China – had expanded some form of social protection (Gentilini et al., 2020a). By June 2020, the number of countries that introduced or expanded such protection had increased to 195 (Gentilini et al., 2020b).

The impact of COVID-19 on Sub-Sahara African (SSA) countries is expected to be considerable, bringing a significant burden on the already struggling economies (OECD, 2020). Most of the countries lack the resources to combat the socio-economic disruption caused by the spread of the virus and the measures intended to combat it. Lack of adequate health facilities, under-developed testing capabilities, the peoples' livelihood structures, living conditions, and other related factors make SSA countries more vulnerable to the pandemic. Luckily, the slow spread of the virus has given African countries time to prepare to fight the virus, though the full impact is yet to be determined (UNECA, 2020). At the early stages of the spread (March 2020), 25 African countries have already closed their borders and imposed travel restrictions[2] while the total number of infected cases detected was only 1,716 in 38 countries (WHO, 2020). By mid-August, the continent recorded over 1.1 million cases with more than 25,000 deaths[3].

In Ethiopia, the first confirmed COVID-19 case was reported on 13th March 2020, almost a month after the first case in Africa and more than two months since China identified the virus. In response, the Government swiftly took measures (Figure 1 below provides more information on these) to contain the spread. A few days after the first confirmed case, it ordered all schools shut, prohibited any mass gatherings, and introduced border closures with strict mandatory quarantine.

Leaders of the country's regional states also took similar measures. After the detection of 55 infected cases and 2 deaths, the federal government declared a state of emergency on 8th April 2020. The state of emergency prohibited gathering of more than four (4) people, eviction of tenants, increases in rent, furlough of employees, termination of contracts, and holding sporting activities. Also, public transport providers were instructed to limit their passenger number to half of each vehicle's/carriage's capacity[4]. These quick responses appear to have helped slow down the spread of the virus in the country during the early period. Indeed, the daily rate of confirmed cases stayed low for the first three months after the first case. Nevertheless, it started to accelerate in July and got even faster in August (see Figure 2 below). As of late-August 2020, the total cases have increased to more than 51,000 and 793 deaths[5].

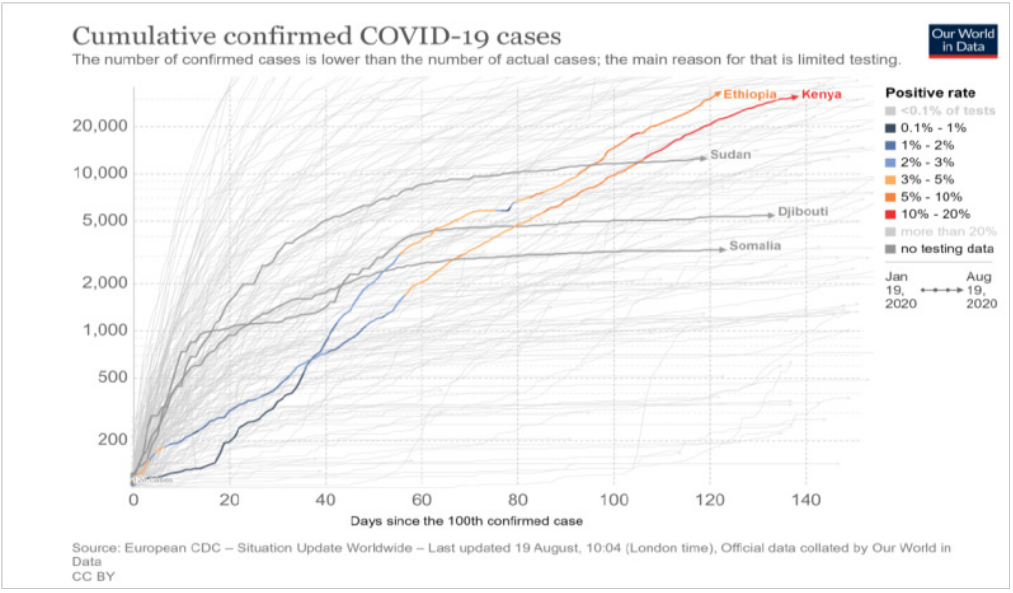
Figure 1: COVID-19 related cases and policy timeline in Ethiopia (up to early May 2020)



Source: Aragie, Taffesse and Tamru (2020)

The above brief description highlights two types of shocks to the Ethiopian economy that are linked with the COVID-19 pandemic and measures aimed at combating it. First, lockdowns in major trading partners and other countries resulted into unexpected reductions in remittances, lower export demand, and delayed imports. These are the main external shocks. Second, the measures introduced by the Ethiopian Government mentioned above, which can be characterized as a partial lockdown, represent the domestic shocks.

Figure 2: Cumulative confirmed COVID-19 cases, 20th August 2020



Source: EPHI, National Data Management Centre for Health (NDMC) - Quick update on COVID-19 on 19th and 20th August 2020

Combined, these shocks are likely to slow down economic activity, dampen economic growth, reduce incomes, and increase poverty relative to the no-COVID state. These effects will occur within the period during which the shocks happen, such that the economy starts the post-shock period from a lower base. In this regard, it is true that both these shocks were countered by the supportive economic interventions the Government introduced to dampen their negative consequences. Nevertheless, the later interventions are not free and involve reallocation of resources. Thus, the observation that the economy will start from a lower post-shock base still holds, although that starting level would not be as low as it would have been in the absence of those ameliorating Government interventions.

This study estimates the short-run welfare consequences of the COVID-19 crisis through its effect on imports, exports, and remittances.[6] By measuring citizens' potential income loss, the study estimates the effect on the national poverty rate and its depth. Finally, the study provides estimated fiscal requirements to alleviate the expected increase in the incidence and depth of poverty.

The rest of the paper is organized as follows. Section 2 discusses the general approach followed to measure the impact. Section 3 presents the data sources used for the analysis along with the updating procedures adopted, while Section 4 discusses the detailed approach used for the analysis. Section 5 presents the findings on the impact of the pandemic on poverty and inequality, followed by estimates of the fiscal cost of prevention in section 6. Section 7 summarizes the findings of similar studies conducted in Ethiopia. The last section concludes.

2. Approach

Ideally, comparing household-level incomes and consumption *expenditures ex-ante* and *ex-post* the crisis provides the most accurate approach to measuring the welfare consequences of the COVID-19 pandemic. Unfortunately, such comparison cannot be made in the present because the requisite data are not available. Given the nature of the pandemic, it is also rather difficult to collect them in future. In contrast, the need for policy interventions to combat the disease and its consequences continues to be urgent. Such interventions demand evidence on multiple fronts including the economic consequences of both the pandemic and actions aimed at dealing with it. It is thus very useful to marshal and use all available information systematically to generate such evidence.

This paper adopts the approach developed by Stephen Younger and presented to research teams from several countries, including Ethiopia, formed by AERC.[7] The approach realistically assumes that there are no up-to-date data that allow standard poverty analysis with and without COVID-19. Instead, it proposes combining available data with reasonable assumptions to assess income losses and poverty consequences. Briefly, the procedure of Lustig et al. (2020) involves the following steps:

Step 1: Estimate the part of household income that is 'at-risk' of loss by industry;

Step 2: Estimate the fraction of households who lose income out of those households with 'at-risk' income and the fraction of 'pre-crisis' income lost by households suffering such income loss;

Step 3: Estimate the level of poverty (headcount and gap) using a given poverty line (national and/or international);

Step 4: Compare the with- and without-COVID levels to assess the impact on poverty; and

Step 5: Estimate the fiscal cost of implementing public programmes aimed at reducing or eliminating the rise in poverty induced by the pandemic.

Stephen Younger provided an adaptable Stata code that implements this approach in each country, including Ethiopia. Accordingly, the paper implemented the following steps.

(i) Estimated household-level consumption expenditures for 2019/20 in the absence of COVID-19 using the latest household expenditure survey data (for 2015/16) combined with national income accounts and population statistics;

(ii) Expressed the national poverty line in 2019/20 prices;

(iii) Used the results of a separate SAM-multiplier analysis to obtain the likely rate of household income losses due to COVID-19 by economic activity and applied those rates to construct a dataset of household consumption expenditure levels for 2019/20 with COVID-19;

(iv) Estimated measures of poverty and inequality with and without the COVID-19 crisis, respectively, using the datasets constructed in steps (i) and (iii) above;

(v) Compared the estimated incidence and depth of poverty with COVID-19 to those without to measure the pandemic's impact; and

(vi) Estimated the fiscal burden of maintaining the pre-COVID level or depth of poverty.

Step (i) is a major difference with the procedure of Lustig et al. (2020). Lustig et al. (2020) propose to start from identifying which individual-working member's income is at risk and subsequently aggregating to arrive at the household-level at-risk income. The departure from that proposal in this paper is a consequence of lack of income information both at the individual member level and at the household level and the availability of household-level consumption expenditure data instead.

Further details on the steps will be provided in subsequent discussion.

3. Data

Sources

Four sources provide the data used by the study.

The first source is the most recent Household Consumption and Expenditure (HCE) survey of the Ethiopian Central Statistics Agency (CSA) administered in 2015/16. This periodic survey is explicitly designed to collect data required for the conduct of poverty analysis in the country every five years or so. The dataset is nationally representative, covering both urban and rural areas of the country's nine (9) regional states and two (2) chartered cities. The survey sample has over 30,000 households (NPC, 2017). This paper thus uses household consumption expenditure as the relevant welfare indicator in its analysis.

The second and third sources are the country's national income accounts and population statistics. They are used in conjunction with the HCE data in the manner outlined below. The fourth source is the simulation reported in Aragie, Taffesse, and Tamru (2020).[8]

Estimating potential income losses due to the pandemic requires measures of the economic shocks associated with the pandemic and analysis/assumptions that assess the corresponding impact on household incomes. In this regard, Aragie, Taffesse, and Tamru (2020) conduct relevant simulations to assess the impact of pandemic-related shocks on economic activities. Their study relies on a 2015/16 Social Accounting Matrix (SAM) for Ethiopia, updated to 2019/20. The SAM, constructed by the Policy Studies Institute (PSI) has 59 activities, 71 commodities, three (3) factors, six (6) household types (by expenditure quintiles and rural-urban location), a government, enterprises, tax instruments, trade and transport margins, investment, and the rest of the world (Mengistu et al., 2020). The SAM multiplier analysis has the advantage of capturing economy-wide interlinkages through direct and indirect effects. Furthermore, it allows the analysis of sudden, large, and temporally very concentrated shocks in an economy.

Aragie, Taffesse and Tamru (2020) focus on three external shocks that they deemed to have major negative consequences, particularly due to what happened during the early phases of the pandemic in the rest of the world. During that period, Ethiopia's major trading partners and sources for remittances introduced complete lockdowns to combat the spread of the disease and mitigate the morbidity and mortality it causes. As a consequence, markets were shuttered, millions of workers were laid-off,

and transport routes/services were disrupted. This global trend and the outlook for 2020-21 is detailed in World Bank (2020). Moreover, according to the same report, the recovery of affected economies after the end of the lockdown appears weaker than desired. The economic slowdown thus induced led to less export demand (including tourism), lower remittances, and delayed imports. It is on the negative impact of these early shocks that Aragie, Taffesse, and Tamru (2020) concentrate. The rate of reduction they estimated for each activity is used as a rough measure of the likely income loss (or fall in consumption expenditure) that corresponding households are assumed to experience.

The HCE 2015/16 survey also collected information on household members' sector of employment and the income source used to finance each recorded consumption expenditure. Accordingly, this study uses the household head's sector of employment to classify households into definite sectors for the purpose of investigating the impact of COVID-19 pandemic.

Updating

This study is part of a cross-country programme that includes Uganda, Kenya, Ghana, and Cote d`Ivoire. Therefore, the paper followed the same approach outlined above to investigate the expected impact of COVID-19 on the poverty headcount and poverty gap, and finally estimate the amount of finance required to fully or partially counter the estimated negative consequences. The approach first estimates the expected share of income loss due to COVID-19 by sector of employment and then assesses the effect on poverty incidence and depth. Subsequently, the fiscal requirements to reverse the rise in poverty measures are calculated. The fiscal burden on the government depends on the aims of the social programmes initiated or expanded – fully or partially maintain the no-COVID-19 level of the poverty headcount or the poverty gap.

The HCE survey of 2015/16 has detailed consumption expenditure data and thus captures household-level welfare status for that year. The reported economic growth in the years from 2015/16 to 2019/20 suggests welfare improvements during the period. The implication is that using the data collected in 2015/16 as is to analyse the situation in 2019/20 will be inappropriate even without COVID-19. Among other problems, it will result in over-estimated pre-COIVD-19 poverty rate and depth for 2019/20. Therefore, appropriate adjustments were made to update the data as discussed below.

According to national accounts data, in the years between 2016 and 2019, the Ethiopian economy has grown on average at 8.7% per year (National Bank of Ethiopia - NBE, 2020). The same data shows that private consumption expenditure grew along with the rise of Gross Domestic Product (GDP). It is thus possible to use the growth rate of per capita private consumption expenditure to update the household consumption expenditure per capita from the HCE survey of 2015/16. Ravallion (2003) explores the potential pitfalls of such use. In the spirit of his findings, this paper applies 85% of the

growth rate of private consumption expenditure per capita at market prices to project household consumption expenditure of the HCE from 2015/16 to the 2019/20. This projection has the added advantage of reproducing the official poverty headcount for 2019/20.

The second adjustment required is to the national extreme poverty line. In 2016, the extreme poverty line was Birr 7,184 per year per adult person at current prices. The Planning and Development Commission uses the temporally relevant GDP deflator series in its projection of poverty line to the year of interest (National Planning Commission - NPC, 2017) and NBE (2020). Following the same approach to enhance comparability with official estimates, this study estimates the 2019 extreme poverty line to be Birr 9,747.4 per year per adult person.[9]

Third, population growth occurred in the years to 2019. Thus, to adjust HCE data representativeness of the 2019 population, the study extrapolated household size using CSA's regional population medium projection rates, assuming equal population growth rate across age groups in the respective regions (Central Statistical Agency - CSA, 2013). This adjustment helps in generating more reasonable per person estimates.

The above three adjustments make the available household-level data to approximately represent the 2019 pre-COVID-19 conditions. The next step involves predicting the amount of household income losses due to the crisis. The approach followed is to estimate potential income loss by sector as the result of three main external shocks to the Ethiopian economy due to the pandemic. As noted earlier, the pandemic and responses to it directly affect Ethiopia's exports, imports, and remittances. To estimate the effect on sectors, a 33% fall in exports, imports, and remittances is assumed relative to the pre-COVID-19 levels lasting for 6 months. The decline is equivalent to a 16.6% fall per annum.

Aragie, Taffesse, and Tamru (2020) simulated the joint impact of the above three external shocks using SAM multiplier analysis that captures the disaggregated impact on the different activities. The results express the rate of reduction in gross output suffered by each activity due to the specified COVID-19 related shocks.[10] The output reductions are aggregated to the level of the 14 main sectors in the national accounts using the share of each activity in the total output of the respective sector as weight (see Table 2 below). These estimated rates of decline in sector-level value-added are treated as the measure of the income loss that households operating in each sector are likely to suffer due to the pandemic. They are applied to total household consumption expenditure to capture the corresponding potential loss in household income.

4. Estimation procedure

The estimation of the likely changes in poverty due to COVID-19 followed the procedure described by Stephen Younger in a presentation to the multi-country research team formed by AERC.[11] As noted above, the study in Ethiopia relies on the HCE survey of 2015/16, which has detailed consumption expenditure at the household level and the industry that working member participates in. Nevertheless, it has no income data at the household or member level. Consequently, it is not possible to directly link risk of income loss to individual members by industry as proposed in the original procedure. A modified one is adopted instead. Using the member-industry paring available in the data, each household is linked with the industry in which its head works. This may not be too inaccurate given that the bulk of the labour force is in agriculture. Indeed, the weighted proportions of household members also working in the same industry as the household head are high. For example, 77% of working spouses are engaged in the same industry as their family's head, so are 80% of sons and daughters.[12]

The household-industry matching thus achieved is combined with the industry-level average rates of income loss estimated via the SAM multiplier analysis described above (see Table 2 below). These rates are applied to household-level consumption expenditure to estimate the potential income loss that may result from the processes and events associated with COVID-19. These represent what Lusting et al. (2020) refer to as income at-risk. All households identified with an industry are assumed to face the same level of at-risk income due to the COVID-19 pandemic. Also, the total income losses computed by applying these rates thus estimate the loss that will occur if all households with at-risk income lose the entire corresponding at-risk income. As discussed in Lusting et al. (2020), there are many intermediate cases that combine a fraction of households with at risk income losing only a part of their at-risk income. In section 5, this paper reports the poverty consequences of some such combinations.

To recap, two key assumptions are made as a basis for the analysis below. First, the activity-level impact of external shocks due to COVID-19 estimated by Aragie, Taffesse, and Tamru (2020) form reasonable approximations of the total income loss during 2019/20 due to the pandemic and measures aimed at coping with it. This assumption allows the study to sidestep two important influences. Household behavioural responses and government policy interventions to cope with the negative economic consequences are not accounted for. These reactions are likely to dampen the detrimental effects, such that outcomes are likely to be better than the estimates.

The impact of domestic shocks and measures such as school closures and reduced operations of some business/factories (particularly early on) are not factored in. Outcomes may thus be worse than the estimates used. It is these counteracting tendencies that suggest the reasonableness of the approximations used.

Second, it assumed that all households in an industry face the same rate of at-risk income as defined above. This presupposition restricts the paper's ability to explore what happens to income inequality due to the pandemic.

5. Impact on poverty and inequality

Ethiopia experienced rapid economic growth for almost two decades following heterodox economic policies summarized in a series of national plans. Total and per capita real GDP grew on average by 9.0% and 6.6% per year, respectively, during 2001/02-2018/19 (Table 1 below). During the Plan for Accelerated and Sustainable Development to End Poverty (PASDEP) period (2005/06-2009/10), the country's real GDP grew at the average rate of 11% per year, matched by a decline in poverty headcount from around 38.7% to 29.6% in 2010 (see Figure 1). This pattern of growth and poverty reduction continued into the Growth and Transformation Plan I (GTP I) (2010/11-2014/15), with real GDP growth averaging 10.1% per annum and the poverty headcount further falling to 23.5% by 2015. For most of GTP II (2015/16- 2019/20), the economy's growth has continued apace albeit at a slightly lower rate (8.7%). Correspondingly, as shown in Figure 3, the poverty rate was projected to drop to 19.7% in 2019/20 in the absence of COVID-19.

Table 1: Real GDP growth (average per year in %)

	2005/6-2009/10	20010/11-2014/15	2005/6-2009/10	2005/6-2009/10
Real GDP growth (average per year in %)	11.0	10.1	8.7	9.0
Real GDP per capita growth (average per year in %)	8.8	7.5	6.3	6.6

Source: Authors' computation from the annual rates reported in National Bank of Ethiopia - NBE (2020)

However, the COVID-19 pandemic has started to impose economic slowdown in the country with direct and indirect pressures on the welfare of society. Apart from its effect on health, the most explicit impact of the crisis on the welfare of households and individuals is loss of income due to disruptions of employment and transfers. Accordingly, the first step in the exploration is estimating the reduction in incomes households are likely to suffer due to the economic and health consequences of the spread of the coronavirus. Following the procedure outlined above, the *maximum* 'at-risk' income of households is estimated. The aggregated at-risk income for each industry is reported in Table 2. The total potential income reduction amounts to US$ 233 million, which is around 3% of GDP. It is highest in agriculture given the size of the sector and its dominance in exports. Trade, transport, and hotels follow in that order.

Table 2: Estimated at-risk income by industry

Industry	At-risk income per month	
	Level (in US$)	% of pre-COVID-19 level[1]
Agriculture, Hunting and Forestry	**158,955,118**	**7.1**
Mining and Quarrying	1,177,850	1.1
Manufacturing	523,399	**7.2**
Electricity, Gas and Water Supply	610,706	5.6
Construction	622,978	0.6
Wholesale and Retail Trade	**26,378,966**	9.6
Hotel and Restaurants	**3,235,738**	**6.5**
Transport and Communications	**4,632,794**	**9.2**
Financial Intermediation	669,247	4.9
Public Administration and Defense	1,039,983	0.7
Education	79,677	0.4
Health and Social work	1,432,194	3.1
Other Services	**5,530,034**	**7.9**

Source: Authors calculation
Note: 1 These rates are calculated from the SAM simulation results of Aragie, Taffesse and Tamru (2020).

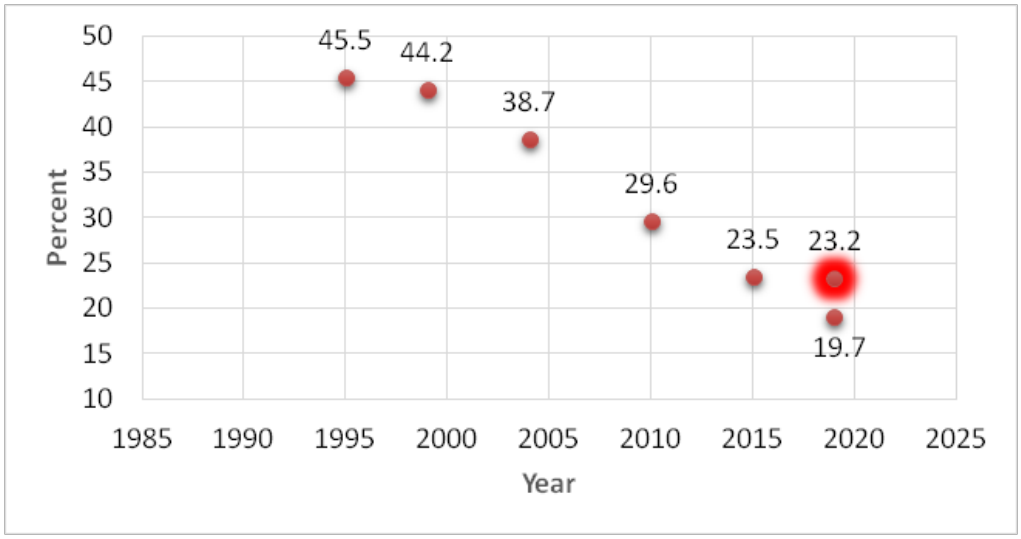
The major consequence of these income losses is a rise in poverty. Indeed, comparison of household consumption expenditures per adult person with the inflation-adjusted national poverty line reveal that the poverty headcount ratio rises to 23.2% due to the pandemic, essentially reverting back to its 2016 level (Figure 3). The increase in the poverty rate represents around 3 million more people falling into poverty (Table 4). The sectoral pattern of the number of people added to the poor reflect the corresponding pattern in income loss, with agriculture accounting for the largest fraction.

Table 2-3, respectively, report the estimated maximum total at-risk income and corresponding change in poverty incidence by industry given the results of the SAM multiplier analysis. In other words, these figures express the levels corresponding to all households with at-risk income lose all of their income rendered at-risk by the pandemic. However, as noted above, it is useful to relax this implicit assumption and consider a range of possibilities defined by combinations of the fraction of households with at-risk income that experience income loss and the fraction of at-risk income they lose. Lustig et al. (2020) describe this procedure as follows:

"…potential losses (are simulated) using a range of two key parameters: the share of households with at-risk income that actually lose income and, of those who lose income, the share of at-risk income lost. Households who actually lose income (from the set of households with at-risk income) are randomly selected. We allow both parameters to range from zero to one-hundred percent (in 10 percent intervals), yielding a ten-by-ten matrix of possible income losses." Lustig et al. (2020: 3)

The possible combinations result potential income loss ranging between 0% and 6.3% – the maximum level derived from the SAM multiplier analysis (Table A1 in the Annex).

Figure 3: Ethiopia - Poverty headcount ratio at national poverty line (% of population)



Source: NPC (2017), World Bank (2020), authors' computation for the 2019/20 headcount ratios with and without COVID-19
Note: The official poverty headcount ratio at national poverty line for 2019/20 is 19%.

Table 3: The number of new poor and change in the poverty headcount by sector

Sector	Number of new poor	Percentage change in poverty headcount
Agriculture, Hunting and Forestry	2,558,393	3.90
Mining and Quarrying	1,739	0.08
Manufacturing	1,358	1.16
Electricity, Gas and Water Supply	6,911	3.22
Construction	5,462	0.27
Wholesale and Retail Trade	210,211	4.06
Hotel and Restaurants	13,708	1.69
Transport and Communications	48,879	6.36
Financial Intermediation	10,439	4.70
Public Administration and Defense	0	0.00
Education	3,732	0.53
Health and Social work	15,661	2.06
Other Services	94,226	5.66
HH elementary employment	15,052	1.82
Unemployed head	212,442	2.74

Source: Authors' calculation

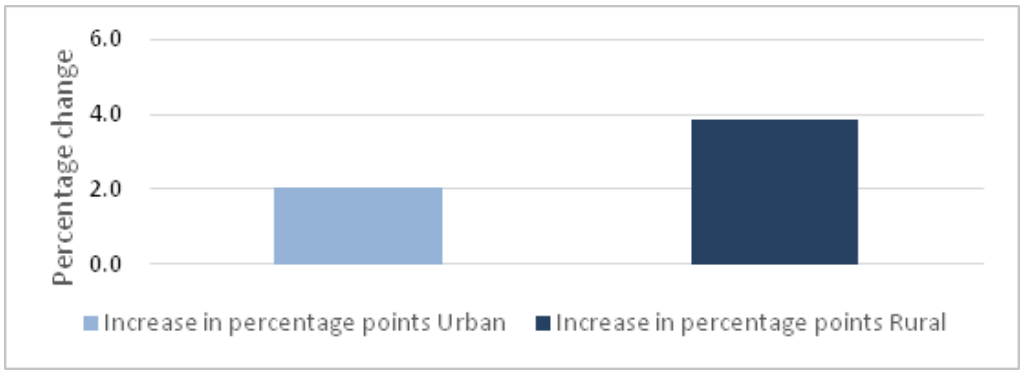
The poverty rate presented in Figure 1 shows the impact of COVID-19 if all households in the respective sectors suffer the entire estimated potential income loss. As expected, the change in poverty varies with what proportion of households with at-risk income that lose income and what fraction of their at-risk income they do lose. Table A2 in the Annex reports 100 such possible outcomes in terms of poverty incidence ranging from no impact (the headcount ratio staying at 19.7%) to the largest impact (the headcount ratio rising by 3.5 percentage points to 23.2%). Interestingly, the simulation results suggest no poverty consequence until 30% of households with at risk income lose 10% of their at-risk income (or 10% of households with at risk income lose 30% of their at-risk income). Alternatively, income losses need to reach 0.2% of total at-risk income (consumption expenditure) before a rise in poverty rate is recorded.

The change in the poverty depth also varies in an analogous manner (Table A3 in the Annex). In these scenarios, the poverty gap ranges between 5.3% (no change) through to 6.4% (a rise of 1.1 percentage points). In other words, the poor, on average, become an additional 1.1 percentage points away from the poverty line relative to the situation without COVID-19.

On the contrary, income inequality remains essentially unaffected (Table A4 in the Annex). It records a negligible 0.1 percentage increase at the maximum loss in income. A likely reason for this lack of response is the assumption that all households in a sector suffer the same rate of income reduction due to the shocks associated with COVID-19. These uniform sectoral rates of income reductions are dictated by the way estimates are obtained (see section 2 above).

The differential effect of the COVID-19 crisis across urban and rural areas is another noteworthy feature. Given the country's economic and demographic structure, the incidence of poverty over the years has been significantly higher in rural areas than in urban ones. More than two-thirds of Ethiopia's population is rural and earns its livelihood from subsistence agriculture. In 2016, the poverty headcount in urban areas was 14.8% while the rural rate was 25.6%. The difference persisted in 2019 with a 20.7% poverty rate in rural areas in the absence of COVID-19. It is estimated that the poverty rate among the rural population increased by 3.9 percentage points due to the pandemic, while the corresponding rise in urban areas is about 2.1 percentage points. Similarly, the pandemic is expected to increase the depth of poverty in urban and rural areas by 0.7 and 1.2 percentage points, respectively. These are somewhat surprising estimates given the predominance of the disease in urban areas so far. The likely explanation is the focus on the effect of external shocks and the considerable role that exports and remittances play in the rural parts of the country (see Beyene and Gebrewold, 2020).

Figure 4: Increase in poverty headcount ratio – rural vs urban



Source: Authors' computation

6. Fiscal cost of prevention

Two policy objectives can be identified relative to the rise in poverty attributable to the COVID-19 pandemic. The Government can aim to maintain the headcount at the pre-COVID-19 level or keep the poverty gap the same. In the first case, the target is the number of the poor while in the second it is the average distance between the income of the poor and the poverty line.

The approach in Lustig et al. (2020) allows the estimation of how much these targets will cost the government and/or its development partners. The results of applying the procedure are reported in Tables A5-A6 in the Annex. To fully prevent the 3.5 percentage point rise in the headcount ratio requires a transfer budget of US$ 125,227,573 per month (or 1.9% of average monthly GDP). The analogous figure for eliminating the 1.1 percentage points increase in the poverty gap index is US$ 91,695,652 (or 1.4% of average monthly GDP). Lower budget requirements are associated with lesser increases in the two poverty indicators (see Tables A5-A6 in the Annex).

The Government can use the already established large rural and urban Productive Safety Net Programmes (RPSNP and UPSNP, respectively) as the implementation platform. Both programmes can be appropriately expanded to reach vulnerable households.

7. Other studies

Several studies focused on assessing the potential economic consequences of the COVID-19 pandemic and associated preventive and coping measures. Some reported specific estimates of the rise in poverty due to the pandemic. Others provide quantitative or qualitative measures of COVID-19-related income loses. Four are particularly relevant.

Goshu et al. (2020a) is an early analysis of the potential economic growth and welfare impact of COVID-19. They construct tree scenarios that vary by the intensity and duration of the pandemic and consequent disruptions as it unfolds – base, mild, and severe. For each scenario, the impact on GDP and real consumption expenditure are predicted. In parallel, the base case poverty estimates are derived from a household sample survey. The rates of decline in real consumption expenditure are subsequently applied to the survey data to identify the effect on poverty originating from the crisis. The mild scenario of Goshu et al. (2020a) is the most comparable to this paper's analysis in that its coverage is restricted to 2020. The corresponding predictions of contraction of consumption expenditure in 2020 range from 2.2% to 9.9%. The associated rise in the poverty headcount ratio spans 0.1-5.3 percentage points. Analogously, the poverty gap index rises between 0.6 and 1.2 percentage points.

Geda (2020) provides another early broad assessment of the potential impact of the pandemic. Only the estimated poverty changes it reports are considered here. Geda (2020) predicts the growth reduction due to the pandemic also under three scenarios (base, mild, and severe). He subsequently translates these reductions into estimates of corresponding poverty effects using the income growth and income inequality elasticities of poverty. Accordingly, in the mild scenario, the 7.8% fall in per capita GDP leads to a 16.7 percentage points rise in the poverty headcount ratio.

Beyene, Ferede, and Diriba (2020) simulate the growth and welfare impact of COVID-19 using a dynamic CGE model. As the above two studies, they also construct three scenarios in terms of the extent of detriment predicted – base, mild, and severe. Variations are also introduced by including or excluding Government interventions in the simulations. The simulations spanning 2019/20 are temporally closest to those adopted in the current paper. Beyene, Ferede, and Diriba (2020) predict a 5.9% and 4.6% drop in GDP and private consumption, respectively, during 2019/20. Both these outcomes involve government interventions including emergency health

interventions, food/cash transfers to the vulnerable, support to businesses and subsidy for job protection. In the absence of these measures, private consumption would have fallen by an additional 1.2 percentage points. Although they do not provide estimates, Beyene, Ferede, and Diriba (2020) observe that the decline in private consumption translates into rising poverty.

In-person field surveys, which would have provided fresh relevant information, could not be conducted due to the pandemic itself. Many research organizations (including the World Bank and IFPRI) and individual researchers switched to telephone surveys as a consequence. Hirvonen (2020) reviews the approach and findings of several such surveys . The findings can be briefly summarized as follows:

- a large majority of households in all phone surveys report lower than usual incomes during the pandemic, with the share of urban households reporting such losses being a bit higher;

- some of the phone surveys find significant falls in remittances;

- the evidence collected suggests that the 'widespread government-led safety net programmes have been successful in protecting incomes'; and

- overall, the negative employment effects appear to be less than what was initially feared.

The estimated effects of the COVID-19 crisis obtained by these studies are markedly varied. Differences in methodology, assumptions, and data explain the bulk of this variation. Nevertheless, all the studies evidently show that the economic consequences of the pandemic can be considerable. The current paper contributes to the growing evidence by conducting a standard poverty analysis combining a nationally representative household consumption expenditure survey data with reasonable assumptions about the potential income shock associated with the pandemic.

8. Conclusion

It has been about six months since the first person infected by the novel coronavirus was detected in Ethiopia. During that period, about 60,000 cases and almost 1,000 deaths have been recorded. Though the spread is not rapid relative to the international experience, the measures taken by other countries' governments and its own government to combat COVID-19 affect the operations of Ethiopia's economy.

Qualitatively, this impact is corroborated by the finding that a significant fraction of rural and urban households recently surveyed report income losses related to the pandemic. This study attempted to estimate how large these income losses are and the consequent impact on poverty status.

This study estimates the impact of COVID-19 on poverty in 2019/20 by only considering its negative shocks to exports, remittances, and imports. These are the domains first hit by lockdowns in other countries. The analysis used a SAM multiplier-based simulation capturing the direct and indirect effects of these shocks on the Ethiopian economy. The potential loss thus estimated can amount to 6.3% of private consumption expenditure. Therefore, the poverty headcount ratio can increase from 19.7% to 23.2% due to COVID-19 in 2019/20 – equivalently, an additional 3 million people falling into poverty in six months period. Similarly, the poverty gap index may rise by 1.1 percentage points (5.3% to 6.4%). Moreover, in recognition of the possibility of many intermediate case that combine a fraction of households with at risk income losing only a part of their at-risk income, the paper reports corresponding alternative poverty consequences (see annex tables).

Two caveats need to be noted. Household behavioural responses and Government policy interventions to cope with the negative economic consequences are not accounted for. These reactions are likely to dampen the detrimental effects such that outcomes are likely to be better than the estimates (however, see lower estimates reported in the annex tables). Secondly, the impact of domestic shocks and measures, such as school closures and reduced operations of some business/factories (particularly early on), are not factored in. Outcomes may thus be worse than the estimates used. It is these counteracting tendencies that suggest the reasonableness of the approximations used.

To conclude, the final poverty outcomes depend on the size and duration of the external shocks this paper focused on and other relevant factors. In this regard, so far, some major exports did not decrease as much as initially feared (coffee and flowers,

in particular). However, declines were recorded across the board in the latest two months, perhaps reflecting the recovery of the world economy that proved slower than desired. Also, delays in imports do not seem to be significant and the initial fall in oil prices proved beneficial. Finally, the various measures the Government has been taking – expand social protection, protect employment, reduce the tax liabilities of businesses, and relevant macroeconomic interventions – should continue to mitigate the welfare consequences of the pandemic.

Notes

1. The authors would like to thank Stephen Younger for providing the Stata code for his procedure of conducting poverty analysis used for this paper and generous support during its implementation; Emerta Aragie and Seneshaw Tamru for sharing their SAM simulation results; the AERC for initiating the multi-country study and providing financial support, David Sahn for his guidance and review; Abebe Shimeles for his continued support and encouragement; and Ibrahim Hassan for comments and suggestions. The usual caveats apply.

2. http://ssa.foodsecurityportal.org/regional-sub-portal-blog-entry/sub-saharan-africa/1891/side-story-top.

3. https://africacdc.org/covid-19/.

4. https://www.fanabc.com/english/ethiopia-unveils-rules-for-emergency-decree/.

5. https://covid19.who.int/region/afro/country/et.

6. The study covers only the short-term impact of the crisis. Long-term effects would likely be important and should be studied.

7. Professor Younger also shared the Stata code that implements the estimation procedure, with each country team instructed to make the appropriate country-specific modifications. He also generously provided advice while the country-teams use the code. The approach is also discussed and used in Lustig et al. (2020). For brevity and ease of reference, from now on the paper refers only to Lustig et al. (2020) given that Stephen Younger is a co-author of that paper.

8. The authors of that study kindly provided us with the details of the simulation results at the level of economic activities included in the SAM they used. We thank them for their generous collaboration.

9. NPC (2017) does not provide an explicit reason for using the GDP deflator instead of the more common Consumer Price Index - CPI. Despite the well-known conceptual differences between the two, the paper continues to follow the NPC's procedure of using the GDP deflator to facilitate comparison with official poverty statistics. Moreover, in the relevant four-year period (2015/16- 2018/19), the quantitative difference between

the two inflation measures was less than 1 percentage point except in 2017/18 when it reached 2.1 percentage points.

10. Given fixed input proportions, the share of valued added in output remains the same. Thus, the level of value-added changes at the same rate as gross output.

11. See Section 2 above on approach.

12. These figures are computed from HCE 2015/16 survey data.

13. See Section 2 above on approach for more on the Lustig et al. (2020) procedure.

14. As noted above, the study uses the rates of decline in sectoral value-added estimated via a SAM multiplier-based simulation of the impact of the COVID-19 related external shocks (Table 2). According to those estimates, the maximum at-risk income is 6.3% of total household consumption expenditure. Also, the possible 'percentage of at-risk income lost' in Table A1 represent fractions of this total.

15. The Ethiopian Socio-economic Survey (or Ethiopia's LSMS) third wave in 2015/16.

16. This change in the poverty headcount ratio is computed by this paper's authors using the estimates and approach of Geda (2020). Geda (2020) predicts that GDP falls by 5.3% in his mild scenario. He takes the relevant population growth rate to be 2.5% per year. It follows that per capita GDP declines by 7.8%. He also assumes that GDP growth uniformly affects inequality by raising/lowering the Gini coefficient by 1 percentage point. Geda (2020) uses the income growth and income inequality elasticity of poverty of 2.3 and 1.2, respectively. Combining these estimates and parameters leads to the figure reported.

17. The composition and magnitude of these interventions are taken from the Government's national COVID-19 response plan. Varying fractions of these planned expenditures are allocated to 2019/20 without ascertaining the extent of actual implementation. See Beyene, Ferede, and Diriba (2020, 11-12).

18. See Hirvonen (2020: 11) for the details of the telephone surveys his review covers.

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Annex

Table A1: Income losses – alternative levels (%)

% of households with at-risk income assumed to lose income	Percentage of at-risk income assumed lost									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
10%	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.6
20%	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2
30%	0.2	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.9
40%	0.2	0.5	0.7	1.0	1.2	1.5	1.7	2.0	2.2	2.5
50%	0.3	0.6	0.9	1.2	1.6	1.9	2.2	2.5	2.8	3.1
60%	0.4	0.8	1.1	1.5	1.9	2.3	2.6	3.0	3.4	3.8
70%	0.4	0.9	1.3	1.8	2.2	2.6	3.1	3.5	4.0	4.4
80%	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
90%	0.6	1.1	1.7	2.3	2.8	3.4	4.0	4.5	5.1	5.7
100%	0.6	1.3	1.9	2.5	3.1	3.8	4.4	5.0	5.7	6.3

Source: Authors' computation

Table A2: Impact on poverty incidence – alternative levels of the headcount ratio (%)

% of households with at-risk income assumed to lose income	Percentage of at-risk income assumed lost									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
10%	19.7	19.7	19.8	19.8	19.9	19.9	19.9	20.0	20.0	20.0
20%	19.7	19.7	19.8	19.8	19.9	20.0	20.0	20.1	20.2	20.3
30%	19.8	19.8	19.9	20.0	20.1	20.2	20.3	20.4	20.5	20.6
40%	19.8	19.9	20.0	20.2	20.3	20.4	20.5	20.7	20.8	20.9
50%	19.9	20.0	20.2	20.3	20.5	20.7	20.8	21.0	21.2	21.3
60%	19.9	20.1	20.3	20.5	20.7	20.9	21.0	21.2	21.5	21.7
70%	20.0	20.2	20.4	20.6	20.9	21.1	21.3	21.6	21.8	22.0
80%	20.0	20.2	20.5	20.7	21.1	21.3	21.5	21.8	22.1	22.3
90%	20.0	20.3	20.5	20.8	21.2	21.5	21.7	22.1	22.4	22.7
100%	20.1	20.4	20.7	21.1	21.5	21.8	22.1	22.6	22.9	23.2

Source: Authors' computation

Table A3: Impact on depth of poverty – alternative levels of the poverty gap index (%)

% of households with at-risk income assumed to lose income	Percentage of at-risk income assumed lost									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
10%	5.3	5.3	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4
20%	5.3	5.4	5.4	5.4	5.4	5.4	5.5	5.5	5.5	5.5
30%	5.3	5.4	5.4	5.4	5.5	5.5	5.5	5.6	5.6	5.6
40%	5.4	5.4	5.4	5.5	5.5	5.6	5.6	5.7	5.7	5.7
50%	5.4	5.4	5.5	5.5	5.6	5.6	5.7	5.7	5.8	5.9
60%	5.4	5.4	5.5	5.6	5.6	5.7	5.8	5.8	5.9	6.0
70%	5.4	5.5	5.5	5.6	5.7	5.8	5.8	5.9	6.0	6.1
80%	5.4	5.5	5.6	5.6	5.7	5.8	5.9	6.0	6.1	6.2
90%	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3
100%	5.4	5.5	5.6	5.7	5.8	5.9	6.1	6.2	6.3	6.4

Source: Authors' computation

Table A4: Impact on income inequality – alternative levels of the Gini coefficient (%)

% of households with at-risk income assumed to lose income	Percentage of at-risk income assumed lost									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
10%	33.0	33.0	33.0	33.0	33.1	33.1	33.1	33.1	33.1	33.1
20%	33.0	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1
30%	33.0	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.2
40%	33.0	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.2	33.2
50%	33.1	33.1	33.1	33.1	33.1	33.1	33.2	33.2	33.2	33.2
60%	33.1	33.1	33.1	33.1	33.1	33.1	33.2	33.2	33.2	33.2
70%	33.1	33.1	33.1	33.1	33.1	33.2	33.2	33.2	33.2	33.3
80%	33.1	33.1	33.1	33.1	33.1	33.1	33.2	33.2	33.2	33.2
90%	33.1	33.1	33.1	33.1	33.1	33.2	33.2	33.2	33.2	33.2
100%	33.1	33.1	33.1	33.1	33.1	33.2	33.2	33.2	33.2	33.3

Source: Authors' computation

Table A5: Total monthly transfer per adult (US$) – constant poverty headcount

% of households with at risk income assumed to lose income	Percentage of at-risk income assumed lost									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
10%	1,319,404	1,443,172	4,472,249	5,202,350	6,704,262	7,859,779	9,754,508	11,389,355	12,651,184	13,024,664
20%	2,197,673	2,607,316	5,669,280	8,114,018	11,909,922	12,996,635	15,972,837	18,415,282	19,729,915	23,636,429
30%	5,271,742	8,114,018	12,835,866	15,972,837	18,318,923	20,363,914	25,814,207	30,637,078	34,269,948	38,592,057
40%	7,729,047	12,568,574	14,865,094	20,363,914	25,310,930	31,862,888	36,458,205	41,140,757	47,798,969	51,052,749
50%	9,913,350	17,124,213	23,417,494	27,484,410	36,116,389	40,710,577	48,569,966	54,098,703	60,264,779	62,535,491
60%	12,755,564	19,511,634	28,632,372	37,217,022	41,093,587	50,339,367	58,566,341	62,524,490	72,147,285	80,170,523
70%	12,755,564	23,341,518	32,600,449	43,400,505	51,710,464	59,173,439	67,647,281	78,606,703	87,378,156	94,997,605
80%	13,053,897	25,728,050	36,885,113	46,109,284	56,876,202	63,854,562	76,058,968	82,614,988	94,035,047	103,665,359
90%	13,053,897	26,127,331	38,696,498	50,026,609	60,995,450	71,296,428	82,691,840	92,626,236	103,001,605	109,870,011
100%	13,134,754	26,617,873	39,255,435	52,274,199	64,850,667	77,399,277	90,238,378	101,462,217	113,524,338	125,227,573

Source: Authors' computation

Table A6: Total monthly transfer per adult (US$) – constant poverty gap

% of households with at-risk income assumed to lose income	Percentage of at-risk income assumed lost									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
10%	922,491	1,844,983	2,767,474	3,689,966	4,612,457	5,534,949	6,641,939	7,748,928	8,671,420	9,778,410
20%	1,844,983	3,689,966	5,719,447	7,564,430	9,593,911	11,623,392	13,652,874	15,682,355	17,896,334	20,110,314
30%	2,582,976	5,350,451	8,117,925	10,885,399	13,652,874	16,604,846	19,556,819	22,508,792	25,460,764	28,597,235
40%	3,689,966	7,379,932	11,069,898	14,759,863	18,634,328	22,508,792	26,567,754	30,442,218	34,501,181	38,744,642
50%	4,612,457	9,224,915	13,837,372	18,634,328	23,431,283	28,228,239	33,209,693	38,191,147	43,172,601	48,338,553
60%	5,534,949	11,069,898	16,789,345	22,508,792	28,228,239	34,132,184	40,036,130	45,940,075	52,028,519	57,932,464
70%	6,457,440	12,914,881	19,556,819	26,014,259	32,840,696	39,482,635	46,309,072	52,951,010	59,961,945	66,788,382
80%	7,195,433	14,575,365	21,770,799	29,150,730	36,530,662	43,910,594	51,475,024	59,039,454	66,603,884	74,352,812
90%	8,117,925	16,235,850	24,353,775	32,471,700	40,774,123	49,076,546	57,378,969	65,681,392	74,168,314	82,470,737
100%	9,040,416	18,080,833	27,121,249	36,346,164	45,386,580	54,611,495	63,836,410	73,061,324	82,286,239	91,695,652

Source: Authors' computation

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