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Estimating Income Losses and Consequences of the COVID-19 Crisis in Uganda

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Abstract

The recent COVID-19 pandemic has come at an overwhelming cost to both developed and developing countries; Uganda is no exception. Despite having relatively few cases, the pandemic's indirect effects arising from an economic contraction and global recession, as well as the direct effects through ill health and death, are likely to have a devastating impact on poverty levels and people's livelihoods. This paper aims to forecast the distributional consequences of the crisis in terms of its effects on poverty and inequality, and to understand how certain policy responses to the crisis might help to offset those effects. Our findings indicate that the income losses from the crisis are severe, erasing poverty gains of the past 10 years, and reaching well beyond Kampala. Using household-level information from the 2016/17 Uganda National Household survey, we explore four different transfer schemes that the government might use to offset the poverty consequences of the crisis: (i) a universal transfer to all households based on their adult equivalence size, but excluding households with income from employment in the public sector or a public sector pension; (ii) a transfer of the same size as in (i), but targeted to only those households that were poor before the crisis began; (iii) an expansion of the SAGE grant to all those 65 years old and older; and (iv) a labor-intensive public works program directed at the hardest hit urban areas.

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1. Introduction

The recent COVID-19 pandemic has come at an overwhelming cost to both developed and developing countries; Uganda is no exception. Despite having relatively few cases, the pandemic has been devastating to Uganda's economy. Severe limitations on international transport have reduced exports and tourism, and have further restricted access to key industrial inputs. Collapse in the world economy has lowered remittances from Ugandans living abroad, while lockdown measures - needed to curtail the virus's spread - have kept people from working, constituting another supply shock and a strain on people's livelihoods.

As a result, growth projections have fallen dramatically to 3.5% in 2020[1] (as compared to 6.5% forecasted in January[2]), while export revenues are expected to almost halve in the coming year,[3] and informal employment is expected to reduce by as much as 42%.[4] The pandemic's direct effects on poverty, through ill health and death are important; but equally so are the indirect effects arising from economic contraction.

The purpose of this paper is to estimate the distributional consequences of the crisis in terms of its effects on poverty and inequality, and to understand how certain policy responses to the crisis might help to offset those effects.

1.1 Mitigating the health risk

The first case of COVID-19 was confirmed in Uganda on the 22nd March 2020 with the first death recorded on the 23rd July. The number of confirmed cases has grown steadily since (see Figure 1), and at the time of writing reached 10,933 confirmed cases and 98 deaths. Furthermore, the daily positive rate (i.e. total confirmed cases as a share of the total number of tests performed) stood at 5.9%[5] in October 2020, above the recommended WHO threshold of 5.0%[6].

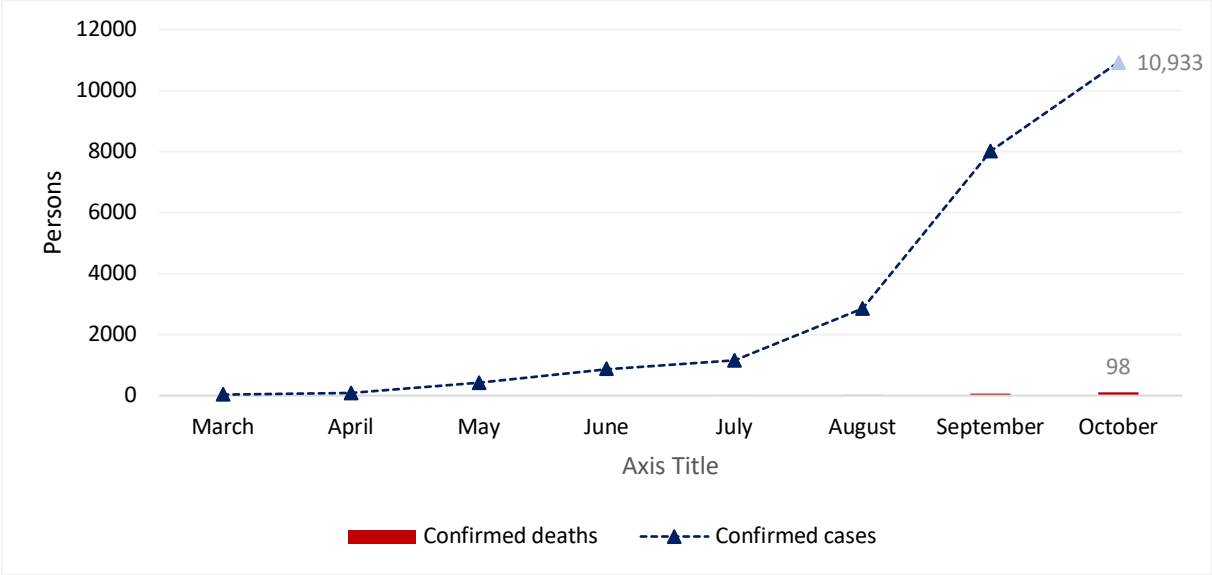
While the health impact of the virus has been relatively limited to date compared to other countries, weak healthcare systems and high levels of co-morbidity mean that a widespread outbreak of the virus poses a significant threat to lives. There is currently limited consensus on the extent to which countries like Uganda are 'shielded' from the worst effects of COVID-19 because of factors such

[1] IMF Regional Economic Outlook (April 2020): https://www.imf.org/en/Publications/REO/SSA/Issues/2020/04/01/sreo0420
[2] World Bank, Global Economic Prospects (2020) *'Outlook for Sub-Saharan Africa'*, January 2020.
[3] Bank of Uganda statistics department: https://www.bou.or.ug/bou/bouwebsite/Statistics/Statistics.html
[4] EPRC (2020) *'How has the COVID-19 pandemic impacted Ugandan businesses? Results from a business climate survey'*
[5] The daily positive rate is reported as a rolling 7-day average. See: Max Roser, Hannah Ritchie, Esteban Ortiz-Ospina and Joe Hasell (2020) - "Coronavirus Pandemic (COVID-19)". Published online at OurWorldInData.org. Retrieved from: https://ourworldindata.org/coronavirus as on October 22nd, 2020.
[6] WHO advised governments that before reopening, rates of positivity in testing (i.e. out of all tests conducted, how many came back positive for COVID-19) should remain at 5% or lower for at least 14 days. See: https://coronavirus.jhu.edu/testing/testing-positivity.

as the relatively young age of its population. Adjusting for lower healthcare system capacity, early estimates suggest that if the virus spreads significantly, the death toll in Uganda could reach between 120 - 480,000 depending on the infection rate.[7]

The disastrous potential effects of the pandemic on health outcomes impact not only on lives but also on livelihoods – losing income earning members of households and redirecting household expenditures towards healthcare can have long term impacts on growth and poverty levels.

Figure 1: Number of confirmed COVID-19 cases and deaths in Uganda*



Source: Ourworldindata.org (2020).
Notes: */Data on confirmed cases and deaths from COVID-19 in Uganda is available up to October 22, 2020. This means that the figures for the month of October 2020 will likely be adjusted upwards. The first case of COVID-19 in Uganda was confirmed on the 22nd of March 2020 and the first death from COVID-19 was recorded on the 23rd July 2020.

As such, implementing early measures to restrict the spread of COVID-19 has been crucial in limiting the health impact of COVID-19 in Uganda. Similar non-pharmaceutical interventions have been shown to have saved an estimated 3.1 million lives in Europe.[8]

[7] Bold et al. (2020). These figures are calculated based on an infection rate of between 20% and 80% of the population, and assume fatality in almost all cases where a case is so severe it would result in hospital admission in France/Europe.
[8] See Flaxman, et al, (2020) "Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe" Nature June 8, 2020).

1.2 Economic impact

But perhaps now more pressing is the economic impacts of the recent pandemic in Uganda. While careful and pre-emptive lockdown measures have forestalled the onset of a health crisis in the country, the economic impact of the pandemic on households across the country is being felt keenly. Falling demand and incomes are a result of two key channels:

- A global recession caused by health and economic crises across the world. The rapid spread of COVID-19 and resultant control measures implemented in a number of countries has resulted in a sharp downturn in economic activity. The global economic is projected to contract by 3 percent in 2020,[9] and growth in sub-Saharan Africa is projected at -1.6%, the lowest level on record.[10] Falling international demand and disruption of supply chains have already had significant impacts on economic activity in Uganda. International tourism, the most significant contributor to Uganda's export earnings, has come to a standstill as a result of restrictions on travel, with earnings projected to fall by 54% in FY 2019/20.[11]

- National containment and mitigation measures themselves, which have restricted economic activity involving face-to-face interaction.[12] From the 20th March – 26th May, the Government of Uganda implemented a nation-wide lockdown on all non-essential business activities and public gatherings in the country. Motorized travel was banned with the exception of transport for cargo, and a national curfew was put in place. While a two-week quarantine for international travelers was already in place, airports were subsequently closed for all travel. While lockdown measures have now largely been lifted for most business operations (with social distancing operating procedures now in place), by disrupting production and reducing demand these have come at a cost to firms and households in terms of additional expenditures as well as revenue and income forgone over this period.

These two channels are likely to have both short- and long-term effects. While revenues, incomes and remittances have experienced substantial declines in the immediate term across the country, falling demand and the suspension of activities have also meant layoffs and closure of businesses without sufficient liquidity and significant disruptions to supply chains which are likely to result in long term impacts on growth and poverty.[13]

[9] IMF (2020) World Economic Outlook, April 2020: The Great Lockdown
[10] IMF (2020) Regional Economic Outlook: Sub-Saharan Africa
[11] Biryabarema (2020) *Ugandan to Lose $1.6 Billion in Tourism Earnings as a Result of COVID-19*.
[12] At the same time, lockdown and mitigation measures come at an opportunity cost in terms of healthcare provision and outcomes. Early estimates suggest that disruptions to health systems and reductions in access to food from the crisis could result in between 250,000 and 1.16 million additional child deaths. [Source: Roberton et al. (2020) 'Early Estimates of the Indirect Effects of the Coronavirus Pandemic on Mater- nal and Child Mortality in Low- and Middle-Income Countries'.]
[13] BRAC (2020) Rapid food and income security assessment, April 4th and 24th, Makerere University, URA and UNCDF (2020) Uganda Business Impact Survey

Several papers already examine the pandemic's effect on poverty both globally[14] and in Uganda[15]. Most of global models use a variety of approaches to estimate declines in global GDP and use this to predict the resulting increase in poverty assuming the income distribution remains constant, i.e., assuming that everyone's income declines proportionally.[16] But of course the income distribution will not remain constant during this crisis. Some people with high *ex ante* incomes now earn nothing. Others are only modestly affected, mostly by spillovers from the losses of others.

In this note, we use microsimulation of crisis-induced income losses to estimate the crisis's effect on poverty and inequality in Uganda. We also examine the extent to which different policy responses might offset those effects. The distinguishing feature of the analysis is that we allow the losses to differ by sector of employment and area of residence based on our assessment of which sectors and areas are most likely to be affected. The approach is similar to that used by the Economic Policy Research Institute's (undated) report, but while they limit the effects of the crisis to micro, small, and medium size enterprises under lockdown,[17] we attempt to capture the other macroeconomic effects of the crisis including spillovers to sectors that are not locked down.

2. Data and methodology

We use information from the 2016/17 Uganda National Household Survey to estimate changes in the distribution of income in Uganda due to both the epidemic and the resultant lockdown. To do this, we must estimate how much income each household loses, a difficult task. Based on a few qualitative surveys of businesses[18] and a review of coverage in the national press, our sense is that the two most important determinants of such losses are the industry in which one works and the place where one lives and works. The lockdown and global recession obviously affect some industries more than others because some are not permitted to operate. But even without the lockdown, the crisis will affect different industries differently. Those dependent on international trade or transport, and those that depend on face-to-face services from which consumers may withdraw out of fear of infection have suffered more than others. In terms of residence, our sense is that the crisis and lockdown are affecting Kampala most severely (in part because of more stringent enforcement), followed by other cities and towns, with the least impact in rural areas.

Based on these perceptions, we set two key parameters about each income earner in the UNHS survey, based on her/his industry and place of residence:

[14] Gerszon Mahler, et.al., (2020); Sumner, et.al., (2020); Teachout and Zipfel, (2020); Vos et.al., (2020)
[15] Economic Policy Research Institute (undated)
[16] Vos, et.al. is an exception that allows the severity of the shock to differ across sectors in a general equilibrium model, but it assumes that the productive structure remains fixed during the crisis. Teachout and Zipfer allows the structure of incomes to change in response to the shock, basing there analysis on a microsimulation of Rwandan data and projecting that structure to the rest of Africa.
[17] They also include an estimate of an individual's loss of income due to the illness itself.
[18] Uganda Revenue Authority, 2020; BRAC, 2020; FSD Uganda, 2020; EPRC, 2020; ILO, 2020

1) First, there is some probability that s/he will lose income in the crisis. This is not necessarily one, even in nonessential industries, as some nonessential companies will manage to function despite the crisis and lockdown. The probability is also not zero, even for essential industries: the epidemic itself and spillover effects from the lockdown will affect some firms and workers in essential industries. Having assessed a probability of loss for each industry and area, we choose UNHS survey respondents at random to lose income in such a way that the number of income losers in the industry is equal to our assumed share for that industry.

2) We then set a second parameter: for those selected to lose income, we estimate the share of their pre-crisis income that they lose. For employees, this is 100 percent: if they lose income, it is because they have lost their job and therefore all their income from that job. For the self-employed and those running businesses, however, the income loss can be less than complete, reflecting the fact that their business may slow, but incomes may not dry up completely. Our estimate of how much they lose again varies by industry and area of residence.

We include the table of loss probabilities and lost income shares in Appendix 1. These two parameters were developed jointly by the Ministry of Finance and IGC using detailed estimates for at-risk income earners at the sectoral (4-digit ISIC code) and geographic level, as well as the probable share of lost income in each category.

The above discussion applies to individual household members' earnings either as employees or as self-employed. Households also have significant income from rent (buildings and land), remittances, and own-consumption of food they produce, all of which are reported at the household, not individual level. This prevents associating them with an industry as we do for individuals' earnings. Nevertheless, some of these incomes are also likely to be vulnerable to the recent shock. We estimate that 20 percent of rents, 30 percent of remittances, and 70 percent of gambling income are lost due to the crisis. All other income – royalties, interest, dividends, pensions, social insurance benefits, and own-consumption from subsistence farming – is assumed to be safe from loss.

Calculating real income from consumption data and real economic growth estimates

Because household consumption data is more accurate than income data in Uganda, we calculate shares of total reported income (in section 11 of the main survey and in the labor survey) pertaining to each type of income recorded and then multiply that share by the standard UBOS household consumption variable to estimate each type of income. So we rely on the reported shares to gauge shares of income, but on household consumption to estimate the scale of total "income" (or welfare) of each household. We then apply the probability of loss and income share lost assumptions to these consumption-scaled measures of income.

Throughout, we have updated the incomes reported in the survey by the Ministry of Finance's estimate of real economic growth between the survey period, 2016/17, and 2019/20 – 17.5 percent – and the Uganda Bureau of Statistics estimate for population growth during that period – 11.3 percent – yielding an estimated increase in per capita GDP of 6.2 percent. But following Ravallion (2003), we only "pass through" 0.85 of that growth to household incomes.

In addition to estimating income losses, we estimate the consequent change in poverty and inequality.

We also simulate four possible transfer schemes to illustrate ways that government policy could offset some of the poverty consequences of the crisis. The first is an almost universal, uniform transfer to everyone in the country except public sector employees and pensioners, calibrated so as to return the poverty headcount to what it was before the crisis. The second scheme provides the same transfer amount to households, but only to those households who were poor before the crisis began. While such a transfer is challenging in practice because it requires knowing with certainty who was poor when the crisis began, it does provide a lower bound estimate of the budgetary cost of assisting those who may have more limited means with which to withstand the current crisis. The third simulation is an expansion of the SAGE grant, currently available to those over 80 years old, to those 65 years old and older. This is a policy government is actively considering but with concerns about its fiscal cost. The fourth simulation of a temporary labor-intensive public works (LIPW) program in the most affected urban areas, a policy that government is undertaking.

3. Results

3.1 Income and welfare effects of the crisis

Table 1 shows our estimate of the income lost from one month of the crisis. These are the combined monthly effects of the general reduction in economic activity due to the epidemic and the lockdown.

Table 1 – Monthly Income Loss from the Crisis

	Income loss				
	LCU (billion)	in USD (million)	share of monthly GDP	# people in HHs losing income	share of population losing income
National	699	184	9.1%	27,028,869	65%
Kampala only	120	31	1.6%	1,168,358	68%
Other Urban only	296	78	3.9%	6,011,267	72%
Rural only	283	74	3.7%	19,849,244	63%

Source: UNHS 2016/17 and authors' calculations

The first result to note is that the losses are large – 9.1 percent of monthly GDP. Relating this result to the previous growth projection (i.e. a 3% decline in annual GDP), would imply that the crisis lasts 4 months and then dissipates completely. However, if economic recovery was to take longer than 4 months, then decline in annual GDP is likely to be greater than 3%. It is therefore promising that some recovery (e.g. from the easing of lockdown measures) is already beginning to occur, after less than 3 months. We also find that the crisis affects many people – 65 percent of the population.

The second result to note is that exposure to the shock is similar in Kampala and other urban areas, with 68 and 72 percent of households in these areas losing income, respectively. Even in rural areas, the impact is not much less. We will see below that these surprising results are due to lost remittances and gifts in other urban areas and especially in rural areas. Another unexpected result is that the total loss in income is larger in rural areas than in Kampala and close to that in other cities, by virtue of the much larger population in rural areas.[19] So while much of the focus of popular discussion has been on Kampala, there is a comparable crisis in other cities and a larger, if more diffuse, crisis in rural areas.

Table 2 gives the poverty impact of the crisis. Nationally, poverty increases by 7.9 percentage points[20], enough to erase most of the poverty reduction of the past 10 years. The national average is surpassed by the increase in Kampala (16.7 percentage points), and other urban areas (12.9 percentage points). Even in rural areas, the increase is substantial (percentage points). Notably, even though Kampala does not have a disproportionate share of those living in households that lose income (see Table 1), it does have a disproportionate share of those falling into poverty (Table 2).

[19] Population shares in the UNHS 2016/17 survey are 4% in Kampala; 20% in other urban areas; and 76% in rural areas.

[20] Recent forecasts from the World Bank estimate an increase in the global poverty of 0.7 percentage points or 49 million people; 47% or 23 million of whom are projected to be in Sub-Saharan Africa (Gerszon Mahler, et.al., 2020). On the other hand, Teachout and Zipfel (IGC, 2020) estimate an additional 36.8 million or 9.1% of Uganda's population falling into poverty as a result of domestic lockdown measures.

Table 3 shows the impact of the crisis on inequality. Nationally (and within rural areas), the impact on inequality is minor, but in Kampala the Gini coefficient increases by 10.5 percentage points, and in other urban areas the increase is 4.7 percentage points. This sharp rise in inequality for Kampala is due to the fact that many people who earned incomes near the middle of the income distribution (before the crisis) now have zero earnings.

Table 2 – Poverty Effects of the Crisis

	Poverty Rate		People falling
	Before Crisis	After Crisis	into poverty (millions)
National	18.9%	26.8%	3.30
Kampala	2.2%	18.9%	0.29
Other Urban	9.1%	22.0%	1.08
Rural only	22.4%	28.5%	1.93

Source: UNHS 2016/17 and authors 'calculations

Table 3 – Inequality Effects of the Crisis

	Gini Coefficient	
	Before Crisis	After Crisis
National	0.419	0.427
Kampala	0.409	0.514
Other Urban	0.410	0.456
Rural	0.376	0.382

Table 4 – Monthly Employment Income Losses and Poverty Effects by Industry of Employment

	Total Lost Income (million UGX per month)	Total Employed	Total Income Losers	Lost Income per Income Loser (UGX per month)	Effect on Poverty[/1]
Growing of crops, ex beverage crops	24,437	3,371,582	792,233	30,845	0.001
Growing of beverage crops	22	71,496	1,012	22,202	0.000
Livestock raising	1,173	150,888	7,938	147,709	0.000
Mixed farming	3,101	991,965	83,344	37,204	0.000
Support to agriculture	2,158	336,638	35,513	60,765	0.001
Forestry	1,268	78,108	10,346	122,573	0.000
Fishing	8,273	147,013	69,050	119,810	0.004
Mining	1,421	70,498	10,445	136,087	0.000
Manufacturing, food and beverage	6,819	148,239	18,160	375,473	0.001
Manufacturing, alcohol	1,519	56,542	22,139	68,597	0.000
Manufacturing, other, and repair	14,234	336,305	84,313	168,828	0.002
Public utilities	1,911	29,516	5,408	353,392	0.000
Construction	38,286	335,819	156,697	244,332	0.007
Wholesale, ex food and agriculture	10,426	87,143	30,603	340,680	0.002
Wholesale, food and agriculture	1,705	97,227	9,653	176,659	0.000
Vehicle sales	18,075	85,380	49,055	368,467	0.001
Retail, non-food	59,820	1,081,011	258,778	231,162	0.007
Retail, food	7,871	338,774	37,861	207,903	0.001
Transport and storage	96,241	449,023	316,576	304,005	0.013
Accommodation and food service	40,901	276,318	166,521	245,622	0.004
Miscellaneous production	49,946	321,202	119,112	419,325	0.004
Professional services	40,635	400,622	121,916	333,307	0.004
Public administration	1,336	91,978	19,928	67,062	0.000
Education	60,307	407,020	267,072	225,808	0.008
Health	691	95,237	9,291	74,379	0.000
Washing, hair care, other personal services	28,959	289,903	144,705	200,127	0.003
Total	521,537	10,145,446	2,847,668	183,145	

Source: UNHS 2016/17 and authors' calculations

Notes: [1/]This effect calculated for each industry independently, subtracting only its income losses from pre-crisis welfare and recalculating the poverty rate for the reduced welfare.

Table 4 decomposes the results for lost earnings (but not rent and remittances) by industry. The industries with the largest number of workers losing employment or self-employment income are: transport, non-food retail, and education, all sectors subject to severe lockdown restrictions. These are followed by growing of non-beverage crops (a result of the very large share of the population working in this industry), accommodation, construction, and personal services.

The last column reports the effect that earned income losses in each sector has on the poverty rate, each calculated separately as the poverty rate for pre-crisis welfare less the income lost in that industry minus the pre-crisis poverty rate. The largest effect is in transport and storage (1.3 percentage points) followed by education (0.8 percentage points)[21], construction (0.7 percentage points), and non-food retail (0.7 percentage points).

Table 5 shows similar calculations for income from rents and remittances and gifts. Loss of rental income has only a minor effect on poverty, but losses of remittances and gifts lead to important increases in poverty, especially outside Kampala. Overall, the losses of remittances have a larger effect on poverty than earned income losses in any single industry in Table 3.

Table 5 – Monthly Income Losses and Poverty Effects from Rent and Remittances

Rent	Total Lost Income (million UGX per month)	Total People in Households Losing Income	Lost Income per Person in Households Losing Income (UGX per month)	Marginal Effect on Poverty[/1]
Kampala	5.9	244,410	24,348	0.000
Other urban	17.9	1,343,700	13,319	0.001
Rural	15.1	2,304,885	6,560	0.001
All Uganda	39.0	3,892,995	10,010	0.001
Remittances and Gifts				
Kampala	12.1	516,785	23,325	0.011
Other urban	31.2	2,953,316	10,552	0.011
Rural	65.4	12,407,986	5,270	0.014
All Uganda	109.0	15,878,087	6,840	0.013

Source: UNHS 2016/17 and authors' calculations

Notes: [1/]This effect calculated for each industry independently, subtracting only its income losses from pre-crisis welfare and recalculating the poverty rate for the reduced welfare.

[21] This result seems surprising given that we have assumed that all public sector employees continue to be paid. But Uganda has many private sector teachers. In fact, many more teachers in the UNHS survey report being private sector employees than public, a result that is at odds with administrative data, particularly at the primary school level. To account for this discrepancy, we selected at random 29 percent of primary teachers who reported working in the private sector in urban areas and 36 percent in rural areas and switched them to the public sector. This yields public/private shares that are comparable in the survey and administrative data. The result here is after that adjustment.

3.2 Simulation of illustrative policy responses - transfer payments

We simulate four transfer schemes that government might use to offset the poverty consequences of the crisis: 1) a universal transfer to all households based on their adult equivalence size, but excluding households with income from employment in the public sector or a public sector pension; 2) a transfer of the same size as in 1), but targeted to only those households that were poor before the crisis began; 3) an expansion of the SAGE grant to all those 65 years old and older (a policy under consideration by government); and 4) a labor-intensive public works program in the worst affected urban areas (an approved policy).[22] . To determine the size of the universal transfer in simulation 1), we choose a transfer just sufficient to return the poverty rate to its pre-crisis level.

An (almost) universal transfer has two important advantages. First, it can be implemented more quickly than an option with a targeting mechanism, both because such a mechanism does not need to be developed and because social workers do not need to exclude untargeted households. Second, everyone who needs help will get it, though perhaps not in the amount necessary. There are also two important disadvantages to a universal transfer: it is expensive, and it transfers money to many households who do not need it. These disadvantages motivate attempts to target benefits.

We also simulate a transfer of the same size as in the first simulation, but perfectly targeted to the pre-crisis poor. Such accurate targeting of the pre-crisis poor is not possible in practice, because it is impossible for a social worker to easily identify households that were or are poor before the crisis began. But this simulation gives something close to a lower bound of the budget necessary to offset the poverty effects of the crisis.

We also simulate two policies, individually and in combination, which are on government's agenda. The first expands the SAGE grant, currently available to those 80 years old or older to those 65 years old or older, except those already receiving a social insurance pension. The second is a labor-intensive public works program (LIPW). This program targets 500,000 to 800,000 beneficiaries in urban areas. Each participant is allowed to work for 12 days per month for up to two months per year at a daily rate of USD1.75. Participation is limited to one person for every four people in a household. The projects and beneficiaries are targeted to wards based on several criteria: (a) divisions with large slums; (b) large number of low income and informal sector workers; (c) areas with high levels of poverty; (d) severity of the COVID-19 outbreak; (e) severity of the impacts of the COVID-19 containment measures; (f) number of jobs lost. Within these areas, households are targeted using the following criteria: i) female headed households in urban and peri-urban areas having at least four family members; ii) all households in urban and peri-urban areas that have at least one child younger than 5 years of age; iii) a person who lost paid employment or means of livelihood during the lockdown; iv) households facing eviction owing to failure to pay rent. Our simulations cannot reproduce these criteria exactly. We select eligible areas based on our knowledge of wards likely to satisfy the criteria shown. Within those areas, we

[22] This program also applies to some rural areas affected by severe flooding in the past year, but we are unable to simulate that aspect of the program.

identify female-headed households; households with children younger than 5 years old; renters; households that have lost at least one labor income in our simulation of the crisis; and households with no able-bodied worker. We select beneficiaries among these households at random until we have 461,779 beneficiaries, the number estimated in the program document for urban LIPW. Given the current employment situation, we assume that the opportunity cost of participants' time is zero so that their net benefit is the full value of the wages they earn.

Table 6 presents the simulation results. For the universal transfer we calculate that a transfer of 9,831 shillings per adult equivalent would return the national poverty line to its pre-crisis level. This would be expensive, 267 billion shillings (3.5 percent of GDP) per month, highlighting the fact that the crisis is far too severe for the government to be able to offset its poverty consequences.[23]

Ugandan policy makers are concerned about any transfer payments going to those who do not need them. We define a transfer's *"*excess*"* as any amount that moves those who were poor before the crisis beyond the poverty line or increases the incomes of those who were not poor before the crisis beyond their income before the crisis. This amount is given in the last column. Regardless of the area covered, just shy of one-half of the transfer budget is "excessive" in this sense, highlighting the second objection to a universal transfer.

A transfer of 9,437 shillings per adult equivalent to all pre-crisis poor reduces poverty by 5.0 percentage points nationally, offsetting about two-thirds of the crisis' effect. The cost of this transfer is less than one-fifth the cost of the universal transfer, and very little of the total budget is "excessive." The overall effect, though, is strongly skewed toward rural areas, where poverty almost returns to its pre-crisis level. In Kampala, on the other hand, this transfer reduces poverty by only 0.3 percentage points, leaving it well above its pre-crisis level. While this transfer yields attractive results, we must remember that perfect targeting of pre-crisis poor would be impossible in practice.

Expansion of the SAGE grant has a surprisingly large budget of 62.4 billion shillings per month. A little less of it is "excessive" than for the universal grant, though the targeting is still far from perfect. Crucially, these transfers would reduce poverty by a relatively small amount – 1.3 percentage points nationally – not nearly enough to offset the enormous increases caused by the crisis. The amount of excess transfer is better than a universal cash transfer, but still significant at 34 percent.

The urban LIPW has a smaller monthly budget than the expansion of the SAGE grant, 35.5 billion shillings per month, but produces only a 0.3 percentage point reduction in poverty nationally, though of course the effect is stronger in Kampala (2.0 percentage points) and other urban areas

[23] If the transfer is calculated for Kampala only – an option that seems unwise given our results that the crisis is much more widespread – the transfer amount to return poverty in Kampala to its pre-crisis level is much larger, 67,723 shillings per adult equivalent, though the overall budget is obviously much reduced, to 82 billion shillings, because only Kampala residents benefit. Similar calculations for other urban areas and rural areas yield smaller transfer amounts, though a policy that targets these areas to the exclusion of Kampala seems unlikely.

(1.3 percentage points). The amount of excess transfer, 31 percent, is similar to the expansion of the SAGE grant.

Combining the two current policy responses – expansion of the SAGE grant and the LIPW – yields a national reduction in poverty of 1.6 percentage points with the reductions being more evenly spread across urban and rural areas. In ordinary times we would see this as a significant reduction in poverty, but it is far from sufficient to offset the poverty increase induced by the crisis.

Table 6 – Compensating Effects of Four Transfer Schemes

Universal transfer sufficient to keep poverty rate constant

	Poverty Rate			Total Budget (monthly)				
	Before Crisis	After Crisis	After Crisis + Transfer	LCU (billion)	in USD (million)	share of monthly GDP	Average transfer per adult equiv (LCU)	Share of excess transfer in total
National	18.9%	26.8%	18.9%	279	73	3.6%	9,831	46%
Kampala only	2.2%	18.9%	2.2%	82	21	1.1%	67,723	47%
Other Urban only	9.1%	22.0%	9.1%	147	39	1.9%	25,277	48%
Rural only	22.4%	28.5%	22.4%	143	38	1.9%	6,669	44%

Transfer to Only the Pre-Crisis Poor

	Poverty Rate			Total Budget (monthly)				
	Before Crisis	After Crisis	After Crisis + Transfer	LCU (billion)	in USD (million)	share of monthly GDP	Transfer per beneficiary (LCU)	Share of excess transfer in total
National	18.9%	26.8%	21.8%	51.8	13.6	0.7%	9,831	12%
Kampala only	2.2%	18.9%	18.8%	0.3	0.1	0.0%	9,831	2%
Other Urban only	9.1%	22.0%	19.9%	5.1	1.3	0.1%	9,831	10%
Rural only	22.4%	28.5%	22.4%	46.4	12.2	0.6%	9,831	12%

Expand SAGE grant to those 65 or older

	Poverty Rate	Total Budget (monthly)						
	Before Crisis	After Crisis	After Crisis + Transfer	LCU (billion)	in USD (million)	share of monthly GDP	Transfer per beneficiary (LCU)	Share of excess transfer in total
National	18.9%	26.8%	25.5%	62.4	16.4	0.8%	10,609	46%
Kampala only	2.2%	18.9%	18.4%	2.5	0.7	0.0%	12,883	29%
Other Urban only	9.1%	22.0%	21.0%	11.5	3.0	0.2%	10,356	37%
Rural only	22.4%	28.5%	27.1%	48.3	12.7	0.6%	10,576	49%

Table 6 – Compensating Effects of Four Transfer Schemes (cont)

Labor-Intensive Public Works Program

	Poverty Rate			Total Budget (monthly)				
	Before Crisis	After Crisis	After Crisis + Transfer	LCU (billion)	in USD (million)	share of monthly GDP	Average transfer per adult equiv (LCU)	Share of excess transfer in total
National	18.9%	26.8%	26.5%	35.5	9.3	0.5%	35,210	34%
Kampala only	2.2%	18.9%	16.9%	7.7	2.0	0.1%	36,749	28%
Other Urban only	9.1%	22.0%	20.7%	27.8	7.3	0.4%	34,818	36%
Rural only	22.4%	28.5%	28.5%	0.0	0.0	0.0%	-	

Expansion of SAGE Grant plus Labor-Intensive Public Works Program

	Poverty Rate			Total Budget (monthly)				
	Before Crisis	After Crisis	After Crisis + Transfer	LCU (billion)	in USD (million)	share of monthly GDP	Average transfer per adult equiv (LCU)	Share of excess transfer in total
National	18.9%	26.8%	25.2%	97.8	25.7	1.3%	14,646	42%
Kampala only	2.2%	18.9%	16.5%	10.2	2.7	0.1%	27,704	29%
Other Urban only	9.1%	22.0%	19.9%	39.3	10.3	0.5%	22,309	37%
Rural only	22.4%	28.5%	27.1%	48.3	12.7	0.6%	10,576	49%

Source: UNHS 2016/17 and authors' calculations

3.3 Conclusions

Our first conclusion is obvious enough: the covid-19 crisis is huge. We estimate a monthly loss of 699 billion shillings per month, 9.1 percent of monthlyGDP. Sixty-five percent of Ugandans live in households that suffer a loss in income, and the poverty rate increases 7.9 percentage points. These effects are larger than what other studies have estimated, perhaps because we consider the combined impact of the epidemic itself and the lockdown responding to it.

More surprising is that significant effects of the crisis reaches well beyond Kampala. The total income lost in other urban areas and in rural areas is five times the income lost in the capital city, and much of that loss is in rural areas. So while it is true that the crisis is more intense in Kampala – the poverty rate there increases by 16.7 percentage points – the much larger population in the rest of the country means that the crisis is more diffuse than we expected.

An important channel for the crisis' spill over into other urban areas and rural areas is declining remittances. We find that this factor alone increases the national poverty rate by 1.4 and 1.3 percentage points in other urban and rural areas, respectively - accounting for about one-third of the crisis' total impact on poverty.

The industries where labor incomes have been hardest hit include transport and storage, education, construction, non-food retail, and personal services. For the most part, these results are expected as these sectors have been directly affected by the lockdown and also employ large numbers of workers. The increase in poverty in education sector, however, is surprising, and reflects the large number of private school teachers in Uganda, most of whom we presume have lost their jobs.

Given the unprecedented size of the crisis and its temporary nature, it makes sense for government to try to offset the poverty consequences with temporary transfers. Completely offsetting the poverty impact is beyond government's means: we estimate that a uniform transfer to all Ugandans (except public sector employees and pensioners) large enough to return the poverty rate would require 279 billion shillings per month (3.6 percent of monthly GDP). If, however, government were able to target the pre-crisis poor precisely and made a similar transfer to each of them, the cost would be much lower but still substantial, 51.8 billion shillings per month. This would offset about two-thirds of the increase in poverty induced by the crisis.

Of course, perfectly accurate targeting is not possible in practice. The two policies government has actually considered to offset the crisis' effects, an expansion of the SAGE grant to those 65 years old and older and an urban labor-intensive public works program, reduce poverty by 1.6 percentage at a cost of 1.3 percent of monthly GDP. This is a non-trivial gain, but far less than the increase in poverty caused by the crisis.

4. Policy options

Confronting such a deep and sudden crisis requires a broad and coordinated response in both the short and medium run. Here, we outline options for alleviating the short-run effects on households, and for facilitating recovery of those sectors that are hit hardest by the crisis, from the vantage point of workers losing income and the impact on poverty. This section does not purport to be comprehensive menu but simply an outline of possible policy responses in each domain.[24] It should further be noted that the microsimulation framework presented earlier in this paper could be used to estimate and assess the effects of various policy combinations listed below once the government's comprehensive program comes into full focus.

4.1 Mitigating welfare losses: social protection and safety net programs

The various cash transfer scenarios shared above are only a subset of a broader set of social protection strategies[25] that can be used by developing countries in a time of crisis to provide vulnerable households with some social safety net. In the case of the exogenous shock created by the current COVID-19 crisis, safety nets are needed help to protect vulnerable households against livelihoods risks, maintain an adequate level of food consumption and prevent them from adopting damaging coping strategies and depleting their assets.

According to Ravallion (1999) two basic principles should guide safety net policies: first, safety nets should efficiently insure the poor by being able to respond flexibly to their needs (i.e. they should be able to respond and adapt quickly to the changing environment and needs of poor households) and second, safety nets should be an integral and intrinsic part of longer term development goals.

The following are examples of safety net instruments that could be considered:

In-kind food distribution: This is one of the social relief measure currently being implemented by the Government of Uganda in response to the COVID-19 crisis. It entails the distribution of food in kind to beneficiaries. The food distributed to beneficiaries can be locally purchased or imported through government purchase or food aid. This type of in-kind assistance is especially useful in cases of food famine, supply chain disruptions, or overall price hikes. Public procurement also has the added advantage of supporting domestic producers if food is sourced locally. However, such in-kind assistance is not highly recommended because it is usually not well targeted to the poor and can create distortions in trade and production (e.g. the development of black markets).

[24] For more information on potential policy responses, see IGC (2020) *COVID-19 Guidance Note: Containment strategies and support for vulnerable households"*

[25] The World Bank defines social safety net programmes as *non-contributory* transfers in cash or in-kind which are usually targeted at the poor and vulnerable. They include cash transfers (conditional and unconditional), in-kind transfers (such as school feeding and food assistance), public works programs, etc.

Employment-based safety nets (Public Works Programs): Public works programs or employment guarantee schemes are the most common employment-based safety nets, often applied in developing countries as they are more suited to the highly informal structure of such economies (many employees work for informal, unregistered businesses) compared to other employment-based social protection measures, such as *unemployment insurance*.

The central element of a public works program according to (Ravallion, 1999) is the public guarantee of low-wage work on community-beneficial projects. Under this approach, the government would finance (say, 15 days a month) work on labour-intensive, community projects at a wage sufficiently lower than the market wage-rate for unskilled labour in a normal period - so as to provide the incentive to return to and accept regular work when available. (Ravallion, 1999) further postulates that the advantage of such a program is that it requires minimal administrative discretion (if projects are technically feasible and initiated by the local community) as anyone who wants work at that wage rate would be signed up to a project.

However, case studies of such programs in other developing countries have shown that difficulties and challenges can arise in implementation. A key example is Chile, whose two public employment programs "*Minimum Employment Program (Programa de Empleo Mínimo--PEM)"* created during the 1975 recession and then the *"Employment Program for Heads of Households (Programa de Ocupación para Jefes de Hogar--POJH)"* created in 1982, are perhaps some of the largest in modern history employing up to 13 percent of the labour force (Reinecke, 2002).

The programs, which were introduced to mitigate the impact of the 1982 recession on unemployment, set wages at 70% of the minimum wage - to reinforce self-selection of the poor workforce and were required to have 80% of project disbursements go to labour costs.

Both programs were generally successful in reducing unemployment, primarily for the bottom 20-30 percent of the income distribution. However, once recovery began to take hold in 1984-85, the programs proved politically difficult to terminate and so were phased out over the 1985-88 period. According to Guzman (2016) this could be because beneficiaries of public programs evaluate that staying in the program for longer periods (including during booms) increases the possibility of becoming a regular (and not merely temporary) public employee.

One further risk posed by employing a public works program, particularly in the current crisis, is that the government faces the double challenge of an economic and public health shock. Labour-intensive work programs (such as those adopted by Chile in the 1980s), risk undermining the government's efforts to mitigate and supress the spread of the disease, as the practising of social-distancing on public work sites may be impractical.

In addition, public works programs require a repository of shovel-ready projects that can be implemented in a timely manner. Uganda's poor public investment management (including poor absorption capacity and delayed implementation) would further complicate the success and efficiency of such programs, not only in terms of impact on poverty, but also fiscal cost.

Cash-transfers: Cash transfers may be conditional or unconditional, universal or targeted to specific groups. *Conditional* cash transfers consist of regular payments to poor households in exchange for compliance and participation in health, nutrition and education programmes, thus helping to improve food security while achieving other human development goals. *Unconditional* transfers, on the other hand, include measures such as: social pensions, child support grants or family allowances. Potentially, they have lower administrative costs and enable poor households to have full command of the resources transferred.

If markets are fully functioning and in the absence of food scarcity, cash transfers have the added advantage of creating a boost to aggregate demand and stimulating the economy. However, if food is scarce (e.g. during famine) and markets are disrupted, cash transfers can create inflationary pressure.

Cash transfers are also often required to compliment other social protection programs that may exclude certain groups. For example, complementary targeted transfers are needed to reach those who cannot and should not participate in public works programs, such as the elderly. Ethiopia's Productive Safety Net Program which provides complementary cash transfers and food relief to those unable to join relief works, is a case study.

Overall, governments in developing counties will have to find creative and context-specific solutions to the economic and welfare impacts of the COVID-19 epidemic, and this kind of mix-and-match of policies may be the best way to build a comprehensive social protection response.

Ethiopia's Productive Safety Net Program[26]

Coverage: 7.2 million or 20.4% of population in 2006
Fiscal Cost: US$225 million or 2% of GDP in FY 2005/06

Until the early 2000s, Ethiopia's response to food insecurity primarily involved providing emergency food aid. While this emergency aid helped save lives, it did not increase people's resilience or help avert food shortages. In 2005, the government launched the Productive Safety Net Program (PSNP) to help chronically poor rural populations smooth consumption through the provision of food and cash transfers, while at the same time create assets and become self-sufficient through a public works program.

Under the PSNP, identified households are assigned to either receive direct support or participate in public works, depending upon whether there is an able-bodied adult in present in the household. Over 80% of program beneficiaries participate in public works and are entitled to 5 days of work per month for 6 months in a year, yielding annual payment approx. USD11. Households that receive direct support through food relief or cash transfers are typically poorer than those participating in public works and receive much lower payments in comparison.

[26] 3ie International Initiative for Impact Evaluation (2017) "Household and economy-wide impacts of a public works programme in Ethiopia"

4.2 Economic recovery: what policy measures can be taken to stimulate recovery of hardest-hit sectors?

At the same time, policy measures will need to be put in place now to facilitate the recovery of most affected parts of the economy. There are a number of cross-cutting fiscal measures the government could consider to stimulate private sector firms and prevent bankruptcies and lay-offs. Some examples include:

- Making available short-term working capital, for example through the government giving loan guarantees for commercial banks to alleviate the business risk;
- Reductions or deferrals of tax payments;
- Fast-tracking outstanding VAT and other tax refunds to firms;
- Reducing business operating costs, for example through reduced electricity tariffs for energy-intensive businesses (agro-processors, manufacturers, lodges etc.);
- Easing loan repayment burdens, for example by allowing loan repayments to be deferred interest free or allowing commercial banks to restructure loans multiple times.

At the same time, given the disproportionate effect of the crisis on particular sectors, there are a government could consider a number of sector-specific policy measures. We limit these recommendations to sectors that matter most regarding workers losing income and impact on poverty.

4.2.1. Transport and storage

A quick recovery of the transport sector is not only important from the perspective of workers in this sector - most economic activities rely on transport and storage services as inputs. For example, for both domestic and international transactions manufacturers, agro-processors as well as the fishing and forestry industry rely on transport services to reach their clients and to source inputs. Similarly, domestic and international tourism, of crucial importance for the accommodation and food service sector, is not possible without a working transport network. Disruptions in the transport sector also bear the risk of undermining the functioning of domestic food markets that could lead to shortages in urban centers. To mitigate the impact of the crisis on the sector, government could consider the following policy measures:

1) Ensure the continuity of cross-border movement of international and regional cargo through:

    - Extending operation hours of border crossings and customs clearance offices through introducing weekend and evening shifts;

- Prioritizing increased testing capacity at those borders that matter most for Uganda's trade and working with regional partners on drivers to be tested at their point of departure;
- Leveraging on digital platforms to reduce human contact and improve the speed of the clearing process (e.g. paperless submission and processing of documents);
- Actively supporting Ugandan importers by alleviating Covid-19 related transport costs, e.g. negotiate with Kenyan authorities and international shipping lines to wave storage and demurrage charges at ports or grant extended grace periods for the clearance of containers.

2) Facilitate the functioning of the domestic transport system by:

- Providing workers and companies that play a crucial role in the domestic transport system with face masks on a prioritized basis;
- Designing rules and enforcement mechanism that enable domestic transport of goods and persons while at the same time minimizing spread of the virus (e.g. restricted number of mask-wearing passengers per mini-van).

4.2.2. Education

Nearly all schools in Uganda are closed to prevent the virus from spreading. Fundamentally relying on in-person interactions, it will be challenging to mitigate the negative impacts of the crisis on the education system and the teachers it employs. Nonetheless, the figures presented in table 4 show that this sector is among those that are most important from an employment and poverty angle. Likewise, the education sector will be paramount to ensure that Uganda is able to attain pre-crisis levels of growth in the coming years through an adequately skilled work force. These considerations necessitate decisive policy action to mitigate the impact of the crisis. The following are some policy options government could consider:

- Maintaining an education budget that will be sufficient to keep public teachers on the pay-roll to ensure that re-opening of schools can proceed seamlessly;
- Inclusive remote learning programmes through public TV/Radio that have already proven successful in other countries (e.g. Nigeria implemented a distance learning programme);
- For these actions, supporting the *Ministry of Education and Sports* in its *COVID-19 Education Sector Response Plan* and leverage on the substantial network of NGOs and private education initiatives in Uganda.

4.2.3. Non-food retail

Retail provides livelihoods for a large share of the population that is severely affected by the lockdown measures. Again, it is important to note that COVID-19 related measures do not only impact the economic activity itself (through the closure of markets), but also inputs into these

activities (domestic and international movements of goods). Policy measures to facilitate quick recovery of the sector could include the following:

- Allow retailers and markets to gradually re-open under strict conditions, e.g. only one customer at a time in a store or market stands only to be allowed with a safety distance;
- Consider options of raising the incomes of those most affected and at the same time facilitate online trading through (temporarily) eliminating the social-media tax;
- A portion of the sector trades with goods that are imported. Ensure that access to this merchandise is not undermined by import bans targeted at reducing the spread of the virus (e.g. import ban on second hand clothes or similar).

4.2.4. Construction

Uganda's construction sector employs a significant number of people and is severely impacted by the lockdown and social-distancing measures. Crucially, Uganda's construction sector is dominated by large formal firms that could be targeted to mitigate the impact of the crisis. Suitable measures could include making available working capital through government backed loans or the deferral of tax payments.

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6. Appendixes

Appendix 1: Assumptions for probability of income loss and share of income lost

Table A.1 gives our best estimate of the probability that employees and the self-employed will lose income and, for the self-employed that do lose income, the share of their earnings they will lose[27], by industry and area of residence. In addition to these estimates, we estimate that households receiving rental income will lose 20 percent; those receiving gambling income will lose 70 percent, as all gambling except that available on the internet is locked down; and those receiving remittances will lose 30 percent. This latter estimate is based on the Ministry of Finance's estimate that international remittances will fall by 40 percent and our assumption that internal remittances flow primarily from Kampala and other cities to rural areas. For the latter, we use or estimate of the decline in income in those cities (34.6% on average in Kampala with a median of 20.2%; 25.6% in other urban areas with a median is 8.6%) and suppose that remittances from these areas will be roughly proportional to their income losses.

Table A.1 – Probability of Loss of Earnings and Share of Earnings Lost, by Industry of Employment and Area of Residence

	What *share of workers* in this industry/activity are likely to lose some or all of their income?			**Of those workers who are likely to lose income, wha*t share of their earnings* are they likely to lose?**		
ISIC four-digit industry classification	**Kampala**	**Other Urban**	**Rural**	**Kampala**	**Other Urban**	**Rural**
Growing of cereals (except rice), legumi	10%	6%	5%	35%	30%	20%
Growing of rice	7%	5%	1%	35%	30%	20%
Growing of vegetables and melons, roots	8%	6%	2%	40%	35%	20%
Growing of sugar cane	9%	7%	5%	30%	30%	20%
Growing of tobacco	12%	11%	11%	40%	40%	38%
Growing of fibre crops	10%	10%	9%	40%	35%	25%
Growing of other non-perennial crops	8%	8%	8%	38%	32%	30%

[27] For employees, we assume the loss is 100 percent of earnings if they lose their job.

Growing of grapes	12%	9%	7%	45%	35%	32%
Growing of tropical and subtropical frui	10%	6%	3%	45%	35%	32%
Growing of citrus fruits	10%	6%	3%	45%	35%	32%
Growing of pome fruits and stone fruits	10%	6%	3%	45%	35%	32%
Growing of other tree and bush fruits an	10%	6%	3%	45%	35%	32%
Growing of beverage crops	9%	8%	1%	40%	35%	30%
Growing of spices, aromatic, drug and ph	7%	6%	5%	50%	40%	30%
Growing of other perennial crops	4%	2%	1%	30%	20%	15%
Plant propagation	0%	0%	0%	0%	0%	0%
Raising of cattle and buffaloes	2%	2%	2%	28%	25%	20%
Raising of sheep and goats	2%	2%	2%	28%	25%	20%
Raising of swine/pigs	15%	9%	8%	28%	25%	20%
Raising of poultry	15%	9%	8%	28%	25%	20%
Raising of other animals	15%	12%	9%	28%	25%	20%
Mixed farming	5%	5%	5%	32%	21%	12%
Support activities for crop production	10%	10%	10%	40%	40%	50%
Support activities for animal production	10%	10%	10%	40%	40%	50%
Post-harvest crop activities	8%	6%	2%	45%	18%	15%
Seed processing for propagation	0%	0%	0%	0%	0%	0%
Hunting, trapping and related service ac	5%	3%	1%	70%	65%	25%
Silviculture and other forestry activiti	35%	25%	10%	50%	45%	32%
Logging	35%	25%	15%	50%	45%	32%
Gathering of non-wood forest products	10%	5%	2%	50%	45%	32%
Support services to forestry	9%	10%	15%	27%	30%	32%
Marine fishing	35%	35%	50%	25%	28%	35%
Freshwater fishing	35%	35%	50%	25%	28%	35%
Freshwater aquaculture	40%	40%	60%	25%	28%	35%
Mining of other non-ferrous metal ores	25%	25%	20%	56%	55%	40%
Quarrying of stone, sand and clay	25%	22%	15%	56%	55%	40%
Extraction of salt	25%	25%	25%	50%	40%	30%
Other mining and quarrying n.e.c.	24%	24%	24%	56%	55%	40%

Support activities for other mining and	24%	24%	24%	56%	55%	40%
Processing and preserving of meat	15%	15%	5%	45%	40%	35%
Processing and preserving of fish, crust	20%	15%	5%	35%	30%	20%
Processing and preserving of fruit and v	12%	12%	5%	35%	25%	18%
Manufacture of vegetable and animal oils	10%	8%	5%	45%	40%	39%
Manufacture of dairy products	10%	8%	5%	38%	30%	20%
Manufacture of grain mill products	5%	5%	5%	50%	50%	50%
Manufacture of starches and starch produ	5%	3%	1%	40%	35%	25%
Manufacture of bakery products	15%	20%	25%	55%	40%	20%
Manufacture of sugar	9%	8%	5%	40%	30%	25%
Manufacture of cocoa, chocolate and suga	45%	55%	67%	35%	35%	80%
Manufacture of prepared meals and dishes	35%	30%	15%	45%	40%	25%
Manufacture of other food products n.e.c	35%	30%	15%	45%	40%	25%
Manufacture of prepared animal feeds	30%	25%	20%	35%	35%	15%
Distilling, rectifying and blending of s	27%	27%	27%	55%	60%	35%
Manufacture of malt liquors and malt	60%	60%	37%	25%	22%	10%
Manufacture of soft drinks; production o	50%	40%	25%	55%	45%	35%
Manufacture of tobacco products	20%	15%	10%	50%	45%	40%
Preparation and spinning of textile fibr	25%	30%	38%	40%	45%	55%
Weaving of textiles	22%	27%	38%	40%	45%	55%
Finishing of textiles	20%	25%	35%	40%	45%	55%
Manufacture of knitted and crocheted fab	20%	25%	35%	40%	45%	55%
Manufacture of made-up textile articles,	20%	25%	35%	40%	45%	55%
Manufacture of cordage, rope, twine and	20%	25%	35%	40%	45%	55%
Manufacture of other textiles n.e.c.	20%	25%	35%	40%	45%	55%
Manufacture of wearing apparel, except f	46%	50%	55%	30%	35%	40%
Manufacture of knitted and crocheted app	20%	20%	20%	50%	50%	50%
Tanning and dressing of leather; dressin	25%	25%	25%	70%	75%	80%
Manufacture of luggage, handbags and the	35%	45%	55%	70%	75%	80%
Manufacture of footwear	35%	45%	55%	70%	75%	80%
Sawmilling and planing of wood	40%	40%	40%	50%	45%	35%

Manufacture of builders? carpentry and j	35%	30%	25%	50%	45%	35%
Manufacture of wooden containers	35%	30%	25%	50%	45%	35%
Manufacture of other products of wood; m	35%	30%	25%	50%	45%	35%
Manufacture of pulp, paper and paperboar	45%	45%	45%	50%	45%	35%
Manufacture of corrugated paper and pape	45%	48%	55%	50%	45%	35%
Manufacture of other articles of paper a	45%	48%	60%	70%	75%	80%
Printing	45%	50%	65%	70%	75%	80%
Service activities related to printing	60%	50%	50%	70%	75%	80%
Reproduction of recorded media	80%	75%	65%	65%	60%	55%
Manufacture of refined petroleum product	40%	45%	50%	35%	35%	50%
Manufacture of plastics and synthetic ru	32%	32%	32%	65%	65%	70%
Manufacture of man-made fibres	32%	32%	32%	55%	55%	60%
Manufacture of pharmaceuticals, medicina	2%	2%	2%	45%	47%	50%
Manufacture of other rubber products	25%	25%	25%	55%	65%	70%
Manufacture of plastics products	25%	30%	35%	55%	65%	65%
Manufacture of clay building materials	20%	15%	10%	65%	65%	70%
Manufacture of other porcelain and ceram	20%	15%	10%	65%	65%	70%
Manufacture of cement, lime and plaster	24%	24%	24%	65%	65%	70%
Manufacture of other non-metallic minera	20%	20%	20%	65%	65%	70%
Manufacture of basic iron and steel	18%	20%	24%	50%	50%	50%
Manufacture of basic precious and other	10%	10%	10%	50%	50%	50%
Casting of iron and steel	24%	25%	28%	50%	50%	50%
Casting of non-ferrous metals	20%	20%	20%	55%	55%	55%
Manufacture of structural metal products	30%	30%	35%	70%	70%	70%
Forging, pressing, stamping and roll-for	15%	15%	15%	60%	60%	60%
Treatment and coating of metals; machini	15%	15%	20%	65%	65%	65%
Manufacture of cutlery, hand tools and g	22%	22%	22%	50%	50%	50%
Manufacture of other fabricated metal pr	30%	35%	38%	65%	65%	50%
Manufacture of furniture	25%	25%	25%	45%	35%	30%
Manufacture of imitation jewellery and r	45%	44%	40%	45%	35%	30%
Other manufacturing n.e.c.	20%	15%	10%	65%	65%	65%

Repair of fabricated metal products	55%	45%	25%	60%	55%	50%
Repair of machinery	60%	50%	35%	60%	55%	45%
Repair of electronic and optical equipment	65%	55%	35%	60%	55%	45%
Repair of electrical equipment	65%	55%	40%	60%	55%	45%
Repair of transport equipment, except mo	60%	50%	35%	60%	55%	45%
Repair of other equipment	60%	50%	35%	60%	55%	45%
Electric power generation, transmission	5%	5%	5%	50%	50%	50%
Manufacture of gas; distribution of gase	35%	35%	40%	50%	50%	50%
Water collection, treatment and supply	10%	5%	5%	60%	55%	50%
Sewerage	10%	5%	5%	60%	55%	50%
Collection of non-hazardous waste	15%	20%	35%	60%	55%	50%
Remediation activities and other waste m	15%	20%	35%	60%	55%	50%
Construction of buildings	50%	50%	50%	60%	65%	70%
Construction of roads and railways	30%	30%	50%	45%	50%	55%
Construction of utility projects (roads	30%	30%	50%	45%	50%	55%
Construction of other civil engineering	30%	30%	50%	45%	50%	55%
Site preparation	24%	25%	30%	45%	50%	55%
Electrical installation	18%	18%	18%	60%	60%	60%
Plumbing, heat and air-conditioning inst	18%	21%	24%	60%	60%	60%
Building completion and finishing	18%	21%	25%	60%	60%	60%
Other specialized construction activitie	24%	28%	35%	60%	65%	70%
Sale of motor vehicles	85%	85%	85%	60%	60%	60%
Maintenance and repair of motor vehicles	45%	30%	15%	60%	60%	60%
Sale of motor vehicle parts and accessor	70%	60%	45%	60%	60%	60%
Sale, maintenance and repair of motorcyc	70%	60%	45%	60%	60%	60%
Wholesale on a fee or contract basis	40%	35%	35%	65%	65%	65%
Wholesale of agricultural raw materials	10%	12%	15%	65%	65%	65%
Wholesale of food, beverages and tobacco	10%	10%	2%	65%	65%	65%
Wholesale of textiles, clothing and foot	70%	60%	40%	65%	65%	65%
Wholesale of other household goods	30%	30%	25%	65%	65%	65%
Wholesale of computers, computer periphe	65%	60%	55%	70%	68%	60%

Wholesale of electronic and telecommunic	60%	50%	42%	70%	68%	60%
Wholesale of other machinery and equipme	45%	40%	35%	65%	65%	65%
Wholesale of solid, liquid and gaseous f	35%	35%	35%	70%	70%	70%
Wholesale of metals and metal ores	35%	30%	30%	65%	65%	65%
Wholesale of construction materials, har	24%	26%	30%	50%	50%	50%
Wholesale of waste and scrap and other p	80%	70%	65%	60%	60%	60%
Non-specialized wholesale trade	35%	35%	30%	65%	65%	65%
Retail sale in non-specialized stores wi	35%	35%	35%	80%	80%	60%
Other retail sale in non-specialized sto	35%	35%	35%	80%	70%	60%
Retail sale of food in specialized store	10%	10%	5%	60%	50%	40%
Retail sale of beverages in specialized	10%	10%	5%	60%	50%	40%
Retail sale of tobacco products in speci	15%	15%	5%	55%	55%	55%
Retail sale of automotive fuel in specia	5%	5%	5%	75%	75%	75%
Retail sale of computers, peripheral uni	45%	35%	33%	70%	65%	65%
Retail sale of audio and video equipment	65%	50%	45%	70%	65%	65%
Retail sale of textiles in specialized s	20%	20%	15%	70%	65%	65%
Retail sale of hardware, paints and glas	50%	45%	45%	40%	40%	40%
Retail sale of electrical household appl	55%	55%	55%	80%	80%	80%
Retail sale of books, newspapers and sta	70%	50%	30%	80%	80%	80%
Retail sale of music and video recording	55%	40%	35%	70%	65%	65%
Retail sale of games and toys in special	70%	55%	45%	80%	80%	80%
Retail sale of clothing, footwear and le	45%	35%	35%	80%	80%	80%
Retail sale of pharmaceutical and medica	2%	2%	2%	20%	20%	20%
Other retail sale of new goods in specia	35%	35%	35%	80%	80%	80%
Retail sale of second-hand goods	80%	80%	75%	70%	70%	70%
Retail sale via stalls and markets of fo	20%	20%	17%	60%	60%	60%
Retail sale via stalls and markets of te	20%	20%	17%	60%	60%	60%
Retail sale via stalls and markets of ot	20%	20%	17%	60%	60%	60%
Retail sale via mail order houses or via	20%	20%	17%	60%	60%	60%
Other retail sale not in stores, stalls	20%	20%	17%	60%	60%	60%
Urban and suburban passenger land transp	90%	80%	75%	70%	70%	70%

Other passenger land transport	90%	80%	75%	70%	70%	70%
Freight transport by road	10%	10%	10%	45%	45%	45%
Inland passenger water transport	90%	90%	90%	80%	80%	80%
Inland freight water transport	20%	18%	10%	65%	65%	65%
Passenger air transport	95%	95%	95%	90%	90%	90%
Freight air transport	10%	10%	10%	45%	45%	45%
Warehousing and storage	35%	30%	20%	60%	60%	60%
Service activities incidental to land tr	35%	35%	35%	65%	65%	65%
Cargo handling	10%	10%	10%	60%	60%	60%
Other transportation support activities	35%	33%	25%	70%	70%	70%
Courier activities	25%	25%	25%	65%	65%	65%
Short term accommodation activities	98%	85%	65%	80%	80%	80%
Camping grounds, recreational vehicle pa	95%	95%	95%	95%	95%	95%
Other accommodation	50%	50%	50%	90%	90%	90%
Restaurants and mobile food service activities	70%	70%	50%	65%	65%	65%
Event catering	95%	80%	70%	80%	80%	80%
Other food service activities	95%	80%	70%	55%	55%	55%
Beverage serving activities	50%	50%	50%	70%	60%	50%
Book publishing	55%	45%	25%	65%	65%	65%
Publishing of newspapers, journals and p	35%	35%	35%	65%	65%	65%
Other publishing activities	35%	35%	35%	65%	65%	65%
Motion picture, video and television pro	40%	40%	40%	50%	50%	50%
Motion picture, video and television pro	40%	40%	40%	50%	50%	50%
Motion picture projection activities	40%	40%	40%	50%	50%	50%
Sound recording and music publishing act	40%	40%	40%	50%	50%	50%
Radio broadcasting	25%	30%	35%	35%	35%	35%
Television programming and broadcasting	15%	22%	25%	35%	35%	35%
Wireless telecommunications activities	15%	22%	25%	15%	15%	15%
Satellite telecommunications activities	15%	22%	25%	10%	10%	10%
Other telecommunications activities	15%	22%	25%	10%	10%	10%
Computer programming activities	40%	35%	35%	75%	70%	70%

Computer consultancy and computer facilities	65%	42%	20%	80%	80%	80%
Other information technology and compute	65%	42%	20%	70%	70%	70%
Data processing, hosting and related act	15%	22%	25%	70%	70%	70%
News agency activities	35%	35%	35%	65%	60%	45%
Other information service activities n.e	35%	35%	35%	65%	60%	45%
Central banking	0%	0%	0%	0%	0%	0%
Other monetary intermediation	20%	35%	45%	35%	40%	60%
Activities of holding companies	35%	35%	35%	60%	60%	60%
Trusts, funds and similar financial enti	35%	35%	35%	35%	40%	60%
Other credit granting	20%	35%	45%	35%	40%	60%
Other financial service activities, exce	20%	35%	45%	35%	40%	60%
Life insurance	20%	35%	45%	55%	55%	60%
Non-life insurance	20%	35%	45%	55%	55%	60%
Other activities auxiliary to financial	20%	35%	45%	40%	40%	40%
Real estate activities with own or lease	35%	30%	24%	80%	80%	80%
Real estate activities on a fee or contr	35%	30%	24%	80%	80%	80%
Legal activities	80%	70%	60%	70%	65%	60%
Accounting, bookkeeping and auditing act	35%	35%	35%	50%	50%	50%
Activities of head offices	35%	35%	35%	70%	70%	70%
Management consultancy activities	50%	40%	15%	70%	70%	70%
Architectural and engineering activities	65%	52%	35%	60%	65%	70%
Technical testing and analysis	35%	35%	35%	60%	65%	70%
Research and experimental development on	35%	35%	35%	60%	65%	70%
Research and experimental development on	35%	35%	35%	60%	65%	70%
Specialized design activities	35%	35%	35%	60%	65%	70%
Photographic activities	80%	75%	40%	75%	75%	75%
Other professional, scientific and techn	35%	35%	35%	80%	80%	80%
Veterinary activities	10%	10%	10%	20%	20%	20%
Renting and leasing of motor vehicles	35%	35%	35%	80%	80%	80%
Renting and leasing of other machinery,	35%	35%	35%	80%	80%	80%
Leasing of intellectual property and sim	35%	35%	35%	65%	65%	65%

Activities of employment placement agencies	90%	90%	90%	89%	89%	89%
Temporary employment agency activities	90%	90%	90%	80%	80%	80%
Other human resources provision	35%	35%	35%	80%	80%	80%
Travel agency activities	90%	90%	90%	95%	95%	95%
Tour operator activities	95%	95%	95%	95%	95%	95%
Other reservation service and related ac	70%	65%	64%	95%	95%	95%
Private security activities	10%	25%	35%	25%	25%	25%
Security systems service activities	5%	6%	7%	15%	15%	15%
Investigation activities	10%	25%	35%	0%	0%	0%
Combined facilities support activities	35%	35%	35%	65%	65%	65%
General cleaning of buildings	30%	40%	45%	60%	60%	60%
Other building and industrial cleaning a	30%	40%	45%	60%	60%	60%
Landscape care and maintenance service a	40%	40%	45%	50%	50%	50%
Combined office administrative service a	40%	40%	45%	50%	50%	50%
Photocopying, document preparation and o	35%	35%	35%	70%	70%	70%
Activities of collection agencies and cr	35%	35%	35%	65%	65%	65%
Packaging activities	50%	40%	35%	50%	50%	50%
Other business support service activities	35%	35%	35%	70%	70%	70%
General public administration activities	35%	35%	35%	2%	2%	2%
Regulation of the activities of providin	35%	35%	35%	10%	10%	10%
Regulation of and contribution to more e	35%	35%	35%	10%	10%	10%
Defense activities	0%	0%	0%	0%	0%	0%
Public order and safety activities	0%	0%	0%	0%	0%	0%
Compulsory social security activities	35%	35%	35%	2%	2%	2%
Pre-primary and primary education	65%	70%	80%	70%	70%	70%
General secondary education	40%	40%	40%	70%	70%	70%
Technical and vocational secondary education	30%	30%	30%	45%	45%	75%
Higher education	40%	40%	40%	65%	65%	65%
Other education n.e.c.	40%	40%	40%	65%	65%	65%
Educational support activities	40%	40%	40%	65%	65%	65%
Hospital activities	3%	7%	10%	3%	2%	1%

Medical and dental practice activities	3%	7%	10%	3%	2%	1%
Other human health activities	3%	7%	10%	3%	2%	1%
Residential nursing care facilities	3%	7%	10%	3%	2%	1%
Other residential care activities	3%	7%	10%	3%	2%	1%
Social work activities without accommodation	35%	35%	45%	80%	80%	80%
Other social work activities without accommodation	35%	35%	45%	70%	70%	70%
Creative, arts and entertainment activities	95%	85%	80%	95%	90%	87%
Library and archives activities	60%	60%	60%	80%	80%	80%
Gambling and betting activities	85%	85%	85%	70%	80%	90%
Activities of sports clubs	80%	80%	80%	70%	70%	70%
Other sports activities	80%	60%	55%	70%	70%	70%
Other amusement and recreation activities	95%	95%	95%	95%	90%	87%
Activities of religious organizations	55%	55%	55%	70%	70%	70%
Activities of political organizations	65%	65%	65%	70%	70%	70%
Activities of other membership organizations	35%	35%	35%	70%	70%	70%
Repair of computers and peripheral equip	60%	50%	45%	65%	65%	65%
Repair of communication equipment	5%	5%	5%	35%	35%	35%
Repair of consumer electronics	35%	35%	25%	60%	60%	60%
Repair of household appliances and home	40%	35%	35%	60%	60%	60%
Repair of footwear and leather goods	35%	35%	35%	50%	50%	50%
Repair of other personal and household g	35%	35%	35%	60%	60%	60%
Washing and (dry-) cleaning of textile a	80%	65%	20%	60%	40%	20%
Hairdressing and other beauty treatment	80%	75%	45%	70%	60%	35%
Other personal service activities n.e.c.	35%	35%	35%	80%	80%	80%
Activities of households as employers of	15%	15%	15%	20%	20%	20%
Undifferentiated goods-producing activit	35%	35%	35%	65%	65%	65%
Undifferentiated service-producing activ	35%	35%	35%	65%	65%	65%
Activities of extraterritorial organizat	35%	30%	25%	65%	65%	65%

Source: Authors' estimates

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