Poverty Projections and Distributional Impacts of the COVID-19 Outbreak in Armenia, Azerbaijan and Georgia[1]

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I. Key Takeaways

This note summarizes the results of micro- and macro-economic simulations to assess the short-term impacts of the COVID-19 outbreak on poverty and distributional outcomes in Armenia, Azerbaijan and Georgia. The simulations project that poverty could increase between 2.2 to 5.2 percentage points in Armenia, 1.5 to 3.2 percentage points in Azerbaijan, and 2.2 to 3.6 percentage points in Georgia, compared to a counterfactual scenario in 2020, without the COVID-19 crisis. In all cases, inequality is expected to rise along poverty indicators. Income losses associated with unemployment are the main drivers of poverty increases in the three countries. Households in Yerevan, Baku City and Tbilisi, and other urban centers are most likely to be impacted in the short-term, along with households relying on incomes from service activities.

The analysis leverages the latest available household microdata in each country,[2] under two approaches.

(1) Macro-Simulations: Forecasted real growth rates of GDP are used to nowcast household consumption and to predict the welfare status of the households in 2020, under: (a) counterfactual scenario without COVID-19), and (b) assuming different macroeconomic shocks derived from the pandemic (baseline and pessimistic scenarios).[3] The approach assumes that all households are impacted equally from the crisis, with no distributional effects.

(2) Micro-Simulations. Different transmission channels from COVID-19 to household welfare are estimated, including: (a) the risks of unemployment, (b) losses in wage incomes among the employed, and (c) reduced remittances inflows. The analysis assigns different shocks to each sectors of economic activity, and it simulates the corresponding losses in household welfare from survey microdata. The microsimulations incorporate the distributional impacts of COVID-19. Nonetheless, they rely on a partial equilibrium approach.

All simulations represent short-term economic impacts of the COVID-19. They do not capture indirect economic impacts of the pandemic. At this moment, they do not incorporate the potential benefits of new social protection schemes and other policy responses to COVID-19. The dynamics, duration, and economic channels of the pandemic will ultimately determine its effects on poverty and inequality. Results will evolve as new data and knowledge becomes available to assess the full impact of the pandemic.

[2] The 2018 Integrated Living Conditions Survey (ILCS) for Armenia; the 2015 Azerbaijan Monitoring Survey for Social Welfare (AMSSW); and the 2018 round of Household Income and Expenditure Survey (HIES) for Georgia.
[3] Macroeconomic projections are taken from the most relevant sources: MTI's MFMod database, the World Economic Outlook (April 2020), and projections by the MTI country teams.

The main results of the simulations are summarized in **Table 1** and **Figures 1.**

Table 1. Estimated poverty indicators, 2020

Poverty Index	Counter factual	COVID-19 Macrosimulation: Baseline scenario	COVID-19 Macrosimulation: Pessimistic scenario	COVID-19: Microsimulation
Armenia				
Headcount Ratio	9.0	11.2	12.9	14.2
Gap	1.9	2.6	2.9	3.9
Severity	0.6	0.9	1.0	2.6
Azerbaijan				
Headcount Ratio	4.0	5.5	6.2	7.2
Gap	0.7	1.0	1.1	1.5
Severity	0.2	0.3	0.3	0.5
Georgia				
Headcount Ratio	13.3	15.5	16.9	16.1
Gap	3.8	4.6	5.0	4.8
Severity	1.7	2.0	2.2	2.2

Sources: Based on data from national household surveys: ILCS 2018 (Armenia), AMSSW 2015 (Azerbaijan), and HIES 2018 (Georgia); macroeconomic forecasts from the MFMod database (as of February and April 2020), WEO (April 2020) and MTI (May 2020).

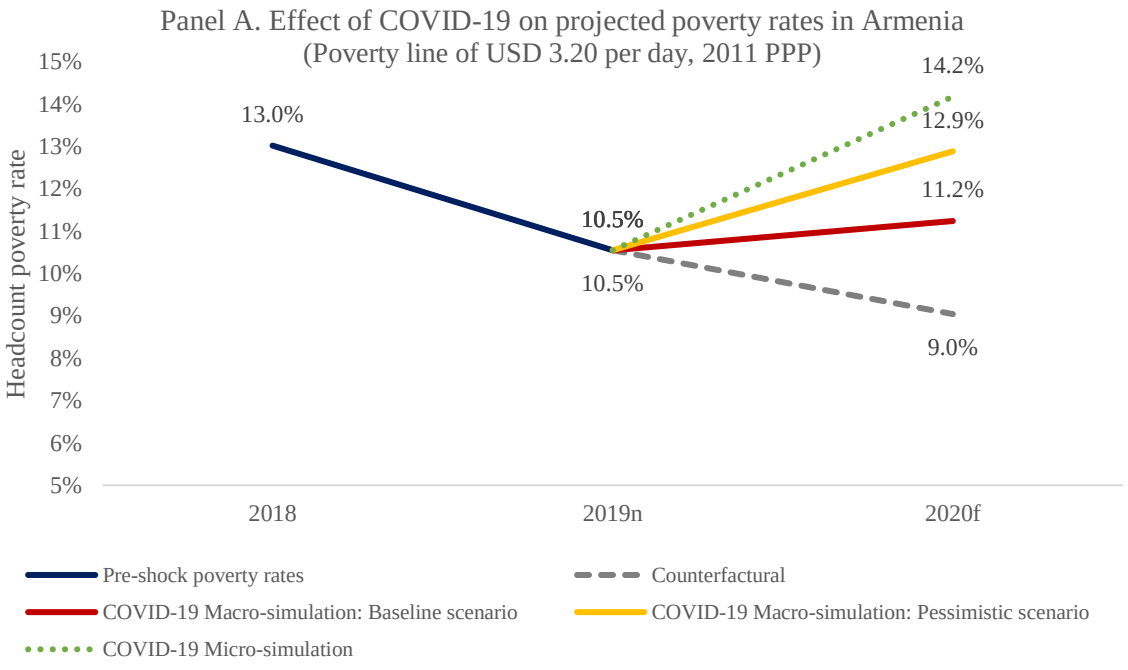
Impacts on poverty

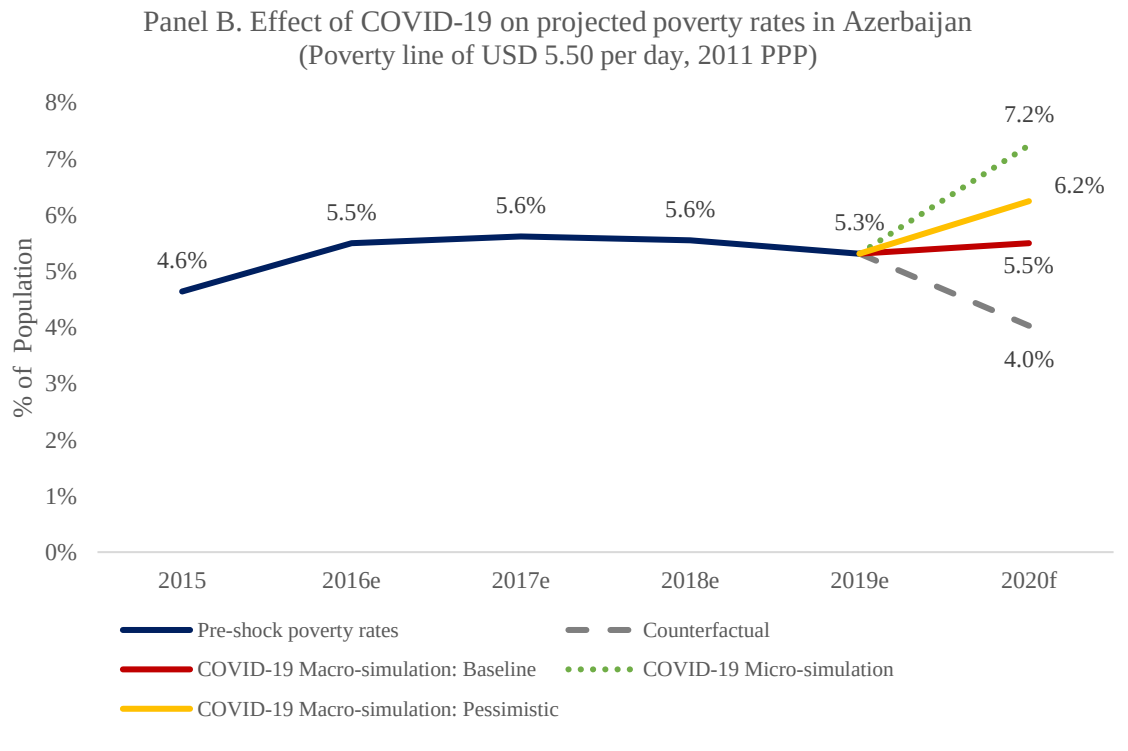
Armenia. The Macrosimulations suggest that poverty (defined by the lower-middle income class poverty line of USD 3.20 PPP) could increase in the range of 2 to 4 percentage points in 2020, relative to a counterfactual scenario. The microsimulations yield higher increases in the poverty rate, poverty gap, and poverty severity, compared to the macro-level exercises.

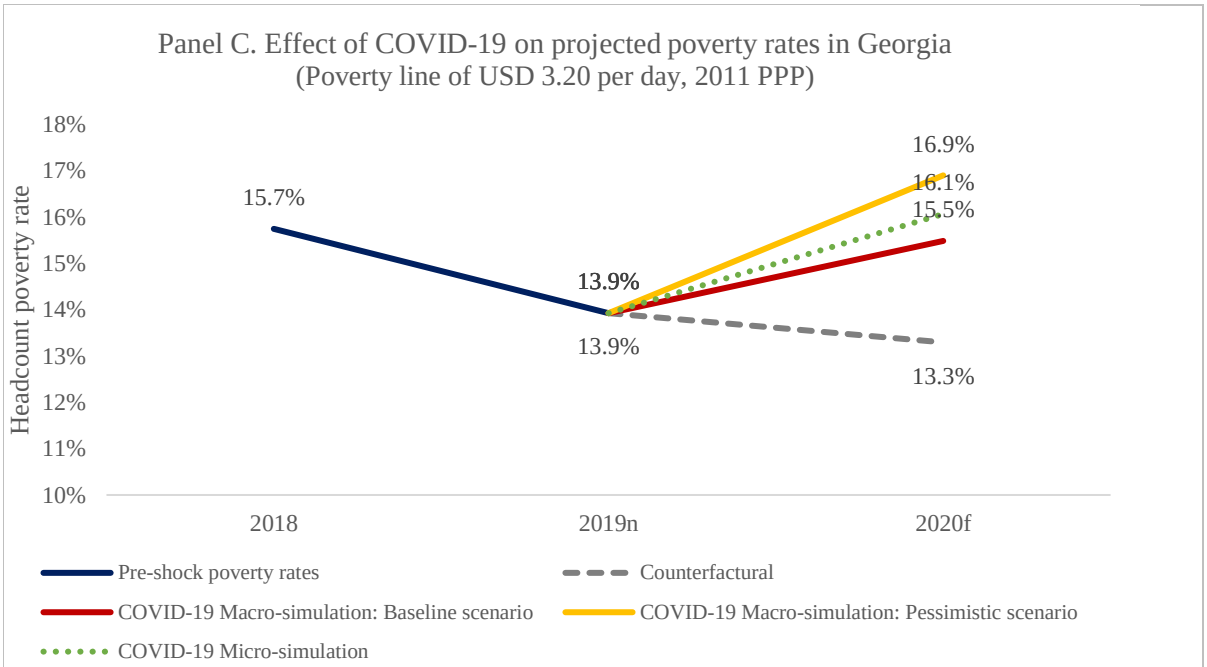
Azerbaijan. Poverty is expected to increase by 1.5, 2.2, and 3.2 percentage points in 2020, under the baseline macrosimulation, macrosimulations under a more pessimistic outlook, and the microsimulations exercises, respectively. The outbreak not only affects the poverty rate but also on the intensity of poverty reflected in the rise in poverty gap and severity indices, with greater impact under the micro-simulation.

Georgia. The pessimistic macroeconomic scenario in Georgia (assuming negative growth rate of -7.5) results in the highest poverty increase of 3.6 percentage points, with respect to the counterfactual of 13.3 poverty rate. Micro simulations project a more modest increase of 2.2 percentage points in poverty (USD 3.20 PPP 2011 poverty line).

Figure 1. Summary of Projected Poverty Indices







Sources: Based on microdata from national household surveys: ILCS 2018 (Armenia), AMSSW 2015 (Azerbaijan), and HIES 2018 (Georgia); macroeconomic forecasts from the MFMod database, WEO (April 2020) and MTI (May 2020). *Notes:* e: Estimated, n: Nowcasted, f: Forecasted. The counterfactual scenario is based on business-as-usual GDP forecasts from MFMod (as of February 2020).

Other country-specific findings

Armenia

- The effects on the national poverty rate would be most significant, with a 7.2 percentage points increase forecasted in the microsimulation model.
- The microsimulations show important heterogeneity. Secondary cities suffer the highest poverty increases (7.2 percentage point increase, compared to 5.1 percentage points at the national level). Yerevan and Sjunik marz face higher shares of income loss. Rural areas face the lowest impact (6 percent of average income loss, compared to the national average of 9 percent). The distributional impact of income losses due to COVID-19 is regressive, with lower-income households facing higher relative losses.
- More disaggregated microeconomic simulations—assuming heterogenous shocks across 21 subsectors of employment—suggest that the largest source of poverty increases comes from unemployment in retail and tourism (using the poverty line of USD 3.20 PPP 2011). However, unemployment in retail, construction and manufacturing is more relevant for extreme impoverishment (USD 1.90 PPP 2011 poverty line).

- Over 470 thousand Armenians could suffer downward mobility, by falling to a lower-welfare group. 234 thousand people who were not poor before the crisis could become impoverished as a result of the economic impacts of COVID-19.

Azerbaijan

- The overall shock in the services sector (including layoffs and decrease in wage) contributes the most to the increase in poverty under the micro simulation, followed by the increase in unemployment across all sectors.
- There are distributional impacts observed across three dimensions in terms of income loss as a share of household's total income: (1) gap across poverty status, with poor households experiencing more than twice as large loss compared to the non-poor (21.4 percent versus 10.2 percent respectively), (2) spatial gap – with larger share of loss among the urban households (concentrated in Baku and Absheron region) compared to rural counterpart (12 percent in urban versus 9.7 percent in rural), and (3) social economic status – with larger loss among the non-beneficiaries of targeted social assistance (TSA) compared to TSA beneficiaries (10.1 percent versus 7.8 percent).
- Projections are based on the 2015 AMSSW, which is the latest household survey available to the World Bank for the analysis. Arguably, economic structure - including employment and income sources - may be outdated to be used as a base for projection. Given that reliable data are the foundation of effective analytical work and evidence-based policy making, the World Bank will continue to make efforts to stepping up engagement with the State Statistical Office and the line ministries to coordinate on the data collection initiative and efforts to enhance statistical capacity building.

Georgia

- The risks of unemployment are the main driver of poverty increases under the micro simulations.
- On average, income losses from COVID-19 represent 8.0 percent of household incomes in Georgia. However, the shares of income losses do not show a clear distributional pattern across percentiles of the population. Income losses are highest in Tbilisi and lowest in rural areas.
- Residents of Tbilisi, households with larger number of children, and households not reporting pension incomes will most likely face higher probabilities of unemployment.
- Half a million Georgians are at risk of suffering downward mobility as a result of COVID-19 in 2020. Over 200 thousand people who were nonpoor before the crisis could become impoverished.
- The extended micro simulation model results in similar poverty changes to the 3-sectoral microeconomic shocks: international poverty increases by 3.3 percentage points and the national absolute poverty rate increases by 3.8.

II. Data sources and Methodology

The analysis uses the latest available survey data in Armenia, Azerbaijan and Georgia to project the welfare of households in 2020 and estimate the impact of COVID-19 crisis on poverty. The most recent survey used for each country is: 2018 round of Integrated Living Conditions Survey (ILCS) for Armenia; the 2015 Azerbaijan Monitoring Survey for Social Welfare (AMSSW); and 2018 round of Household Income and Expenditure Survey (HIES) for Georgia.

(1) Macro Simulations

The projected real growth rate of GDP per capita is used to adjust the household consumption aggregate in 2019[4] and to predict the welfare status of the households 2020. To assess the impact of COVID-19 on economic growth, we estimate a 2020 business-as-usual or counterfactual scenario, by leveraging pre-crisis estimations of GDP growth produced by MTI prior to the COVID-19 outbreak (February 25, 2020). Second, ex-post economic growth forecasts are used to predict the marginal effects of the pandemic on household welfare. Growth forecasts are taken from several available sources, including MTI's database (MFMod) (latest forecasts dated April 13, 2020),[5] other forecasts from MTI country teams, and the World Economic Outlook (April 2020).

Table 2 summarizes the GDP growth forecasts and the sources of data. For all countries, a **"baseline" scenario** of GDP growth informs the main post-COVID macro-simulations. For Armenia, the baseline scenario was provided by the country economists, projecting negative growth rate of -2.8 percent in 2020. For Georgia, the baseline is taken from IMF projections, at -4.0 percent GDP growth in 2020.[6] For Azerbaijan, a baseline scenario of -1.0 percent growth in 2020 is considered. For all three countries, additional forecasts by country economists are used in a more **"pessimistic"** or upper-bound scenario of the economic impacts of the pandemic.

In contrast to the micro-simulation approach, this approach assumes that all households are impacted equally from the crisis with no distributional impact. A pass-through rate (from income growth to poverty changes) of 100 percent is assumed in all simulations.

[4] Consumption aggregates in 2019 are nowcasted using the latest household survey available in each country. Methodological details are described in the Annex.
[5] Data are available from \\gpvfile\GPV\Knowledge_Learning\Pov_Projection\Central_Team\MFM-allvintages.dta. The methodology and assumptions incorporated into the macro projection in MFMod database are unknown to the authors. Since our poverty projections are based on these macro forecasts, estimates will change with the updates on these macro figures.
[6] World Economic Outlook, April 2020: The Great Lockdown. (https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020).

Table 2. Assumed macroeconomic scenarios and comparators

	Assumed GDP forecasts		Comparators: GDP forecasts from World Economic Outlook
	Pessimistic scenario	Baseline scenario	
Armenia	[-6.5%,	-2.8%]	-1.5%
Azerbaijan	[-4.4%,	-1.0%]	-2.2%
Georgia	[-7.5%,	-4.0%]	-4.0%

Source: Forecasts from the country teams as of May 5, 2020, and World Economic Outlook (April 2020).
Note: Azerbaijan's baseline scenario is taken from the MFMoD database (forecasts as of April 13, 2020).

(2) Micro Simulations

The impacts of COVID-19 are also simulated from a microeconomic perspective, by identifying possible transmission channels to household welfare, through: unemployment, labor incomes, and other sources of household incomes.[7] After nowcasting the household welfare aggregates to 2020,[8] this approach assumes heterogenous shock parameters for three sectors of economic activity (agriculture, industry and services), and it calculates the corresponding losses in household welfare. The detailed methodology is included in **Appendix A.3.** The main assumptions of the micro-models are:

Box 1. Assumptions in Micro-level simulations

1. Loss of labor incomes

1.a. Unemployment shock. A share of workers faces reduced incomes due to layoffs or loss of jobs:

- Both hired employees and self-employed workers can be potentially laid-off.
- The unemployment shock in the model is randomly assigned across all workers of one sector.
- Workers in service activities face a probability of .30 of losing their jobs. The corresponding probability for industry is .10. Agricultural workers do not become unemployed as a result of COVID-19.
- Workers losing their job suffer a 100 percent wage income loss.

1.b. Reduced wage incomes. Workers who remain employed may also face partial losses to their labor incomes, resulting from declining salaries, reduced hours worked, sickness, etc. Active workers face:

- 30 percent decrease in wage incomes in the service sector;
- 20 percent decrease in wage incomes from industry; and

[7] The note follows the framework proposed in the note published in April 2020 by the World Bank's Poverty & Equity Global Practice, *Poverty and Distributional Impacts of COVID-19: Potential Channels of Impact and Mitigating Policies*.
[8] A standard nowcasting procedure is applied to "update" the latest available household survey data to 2020. This procedure yields a counterfactual scenario in 2020, that is consistent with the pre-COVID macroeconomic models.

- 10 percent decrease in wage incomes from agriculture.

2. Declines in other household incomes.

- Household incomes are expected to fall due to declining remittances inflows, as the global and national economies contract. Remittances incomes are assumed to fall by 30 percent.[9]
- Household incomes from agricultural sales—when available in the data for Georgia and Armenia—are assumed to fall by the same proportion as agricultural wages (e.g. 10 percent).

All shocks are assumed to last for 3 months of 2020.

Table 3. Summary of assumptions in Micro-level simulations

Scenario	Probability of unemployment			Declined labor incomes			Fall in other household incomes	
	Services	Industry	Agriculture	Services	Industry	Agriculture	Remittances	Agricultural sales
COVID-19 Micro-simulation	.30	.10	0	30%	20%	10%	30%	10%

Source: Author's. *Notes:* Workers assigned to unemployment lose 100 percent of their wage incomes from that sector. The effects on agricultural sales is only calculated for Armenia and Georgia. Labor incomes consider reported wages from employed and self-employed workers.

The microeconomic approach does capture the distributional impacts of COVID-19. However, results should be interpreted as a lower-bound scenario, as they only account for the short-term impacts of COVID-19, by assuming that household incomes and employment will be affected for three months of 2020 only.

In the case of Georgia and Armenia, an extended microeconomic analysis is performed to assess more disaggregated effects of COVID-19 on different subsectors of the economy. The household surveys are used to identify and to shock 21 subsectors of employment, including tourism activities.[10] Assumptions are summarized in **Appendix A.5**.

The ultimate impact of the pandemic will depend on its severity and duration of the pandemic which may be different from the assumptions of our model. Thus, the eventual economic impact may be different from the results reported here and this analysis should be considered as illustrative based on the preliminary evidence.

[9] According to The World Bank Remittance Report, 2020, global remittance is predicted to decline by 20 percent globally, and 28 percent for ECA region. In the simulation, the rate of contraction is rounded up to 30 percent.
[10] The 21 subsectors are classified following NACE Rev. 2.

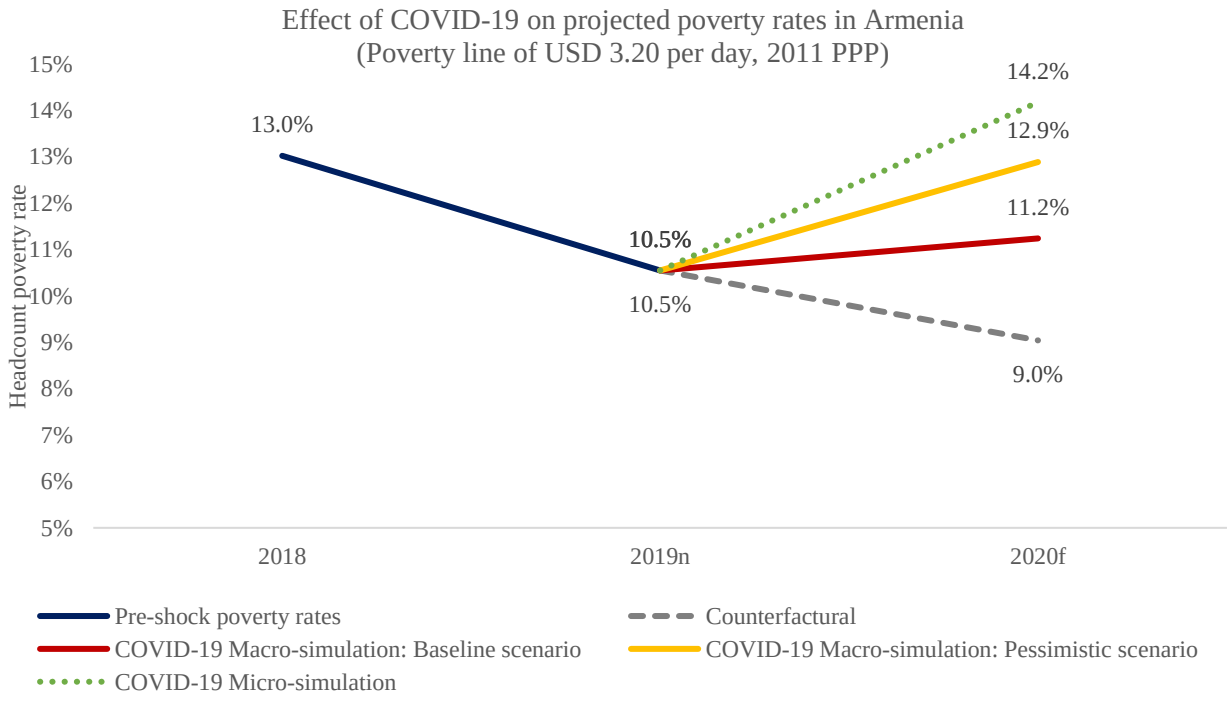
III. Main Results

This section shows poverty projections for the three countries and presents potential distributional impacts under the micro simulation approach. Poverty rates are estimated against the international poverty lines of USD 5.5 for Azerbaijan and USD 3.2 for Armenia and Georgia, all in 2011 PPP terms.

Results for Armenia

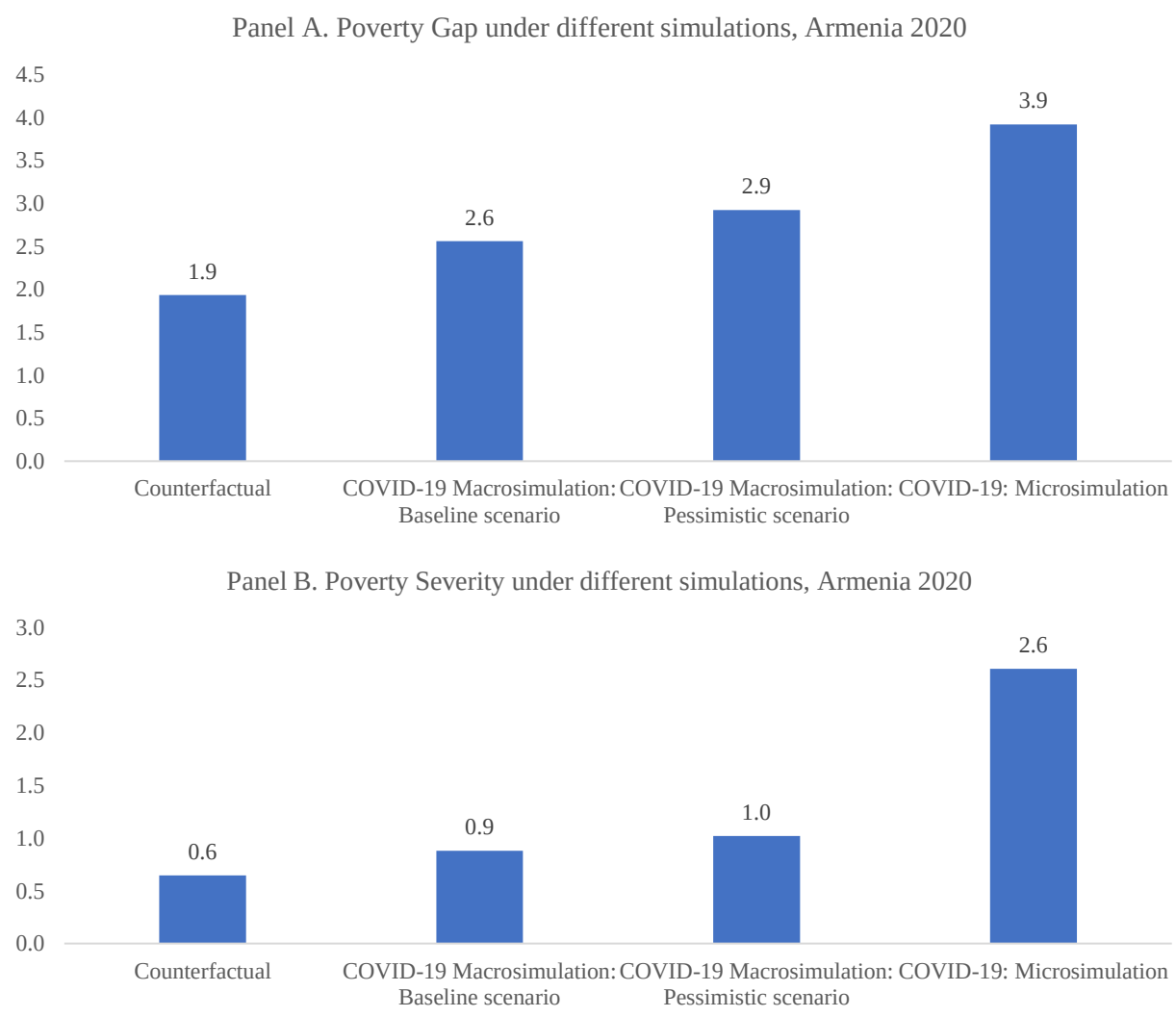
The Macrosimulations suggest that poverty (defined by the lower-middle income class poverty line of USD 3.20 PPP) could increase in the range of 2 to 4 percentage points in 2020, relative to the counterfactual scenario (**Figure 2**). The microsimulations yield higher increases in the poverty rate, poverty gap, and poverty severity, compared to the macro-level exercises. According to the micro simulation, the poverty gap could double, and poverty severity could quadruple following the welfare and distributional effects of COVID-19 (**Figure 3**).

Figure 2. Effect of COVID-19 on projected poverty rates in Armenia



Sources: ILCS 2018, MFMod database and MTI projections. *Notes*: n = nowcasted, f = forecasted. The counterfactual scenario is based on business-as-usual GDP forecasts from MFMod (as of February 2020). The baseline and pessimistic macro simulations assume GDP growth of -2.8 percent and -6.5 percent in 2020, respectively.

Figure 3. Projected Effect of COVID-19 on Depth of Poverty in 2020

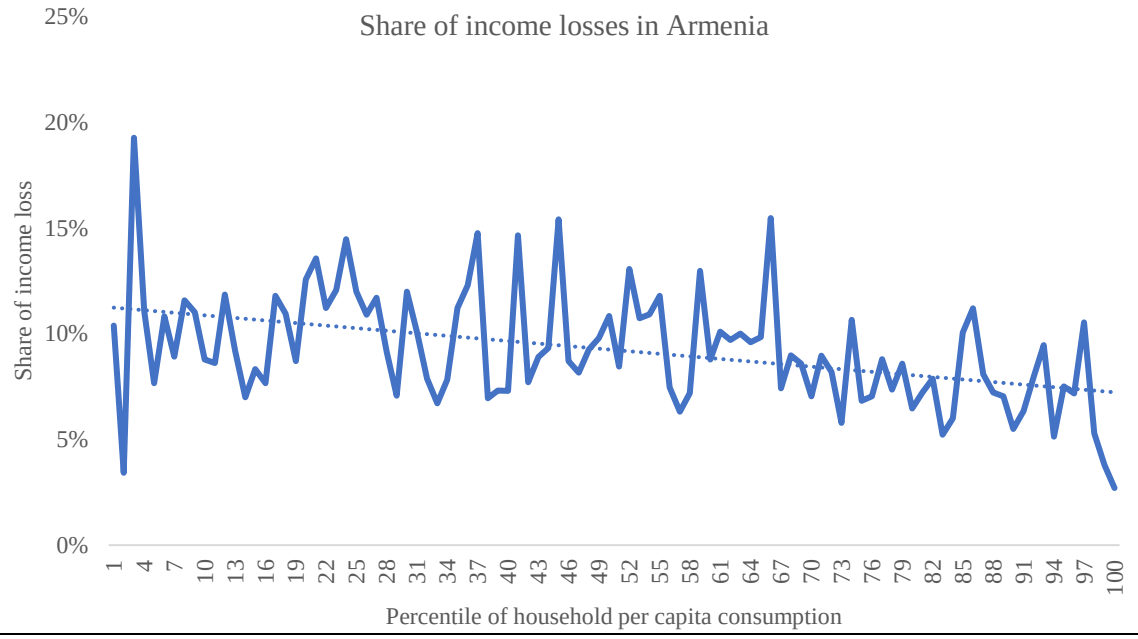


Sources: ILCS 2018, MFMod database and MTI projections. *Notes*: n = nowcasted, f = forecast. The counterfactual scenario is based on business-as-usual GDP forecasts from MFMod (as of February 2020). The baseline and pessimistic macro simulations assume GDP growth of -2.8 percent and -6.5 percent in 2020, respectively. Poverty indicators based on the poverty line of USD 3.20 (PPP 2011).

The distributional impact of income losses due to COVID-19 is somewhat regressive, with lower-income households facing higher relative losses (**Figure 4**).

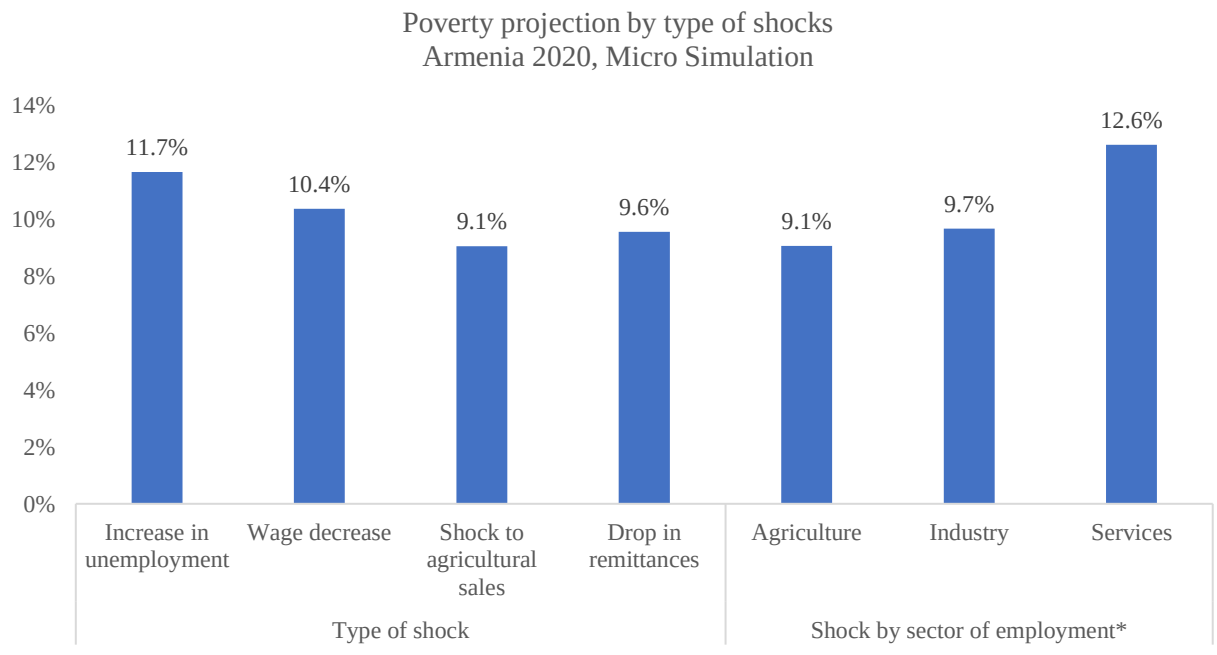
Applying the micro simulation model suggests that increased unemployment is the most significant source of poverty increases, followed by the loss of wage incomes. Employment in services is most affected (**Figure 5**).

Figure 4: Distributional incidence of income losses related to COVID-19



Sources: Microsimulations based on the ILCS 2018 and the MFMod database. *Note*: Welfare percentile is based on the projected consumption aggregate under the micro simulation for 2020.

Figure 5. Effects of micro-simulation on poverty rates



Sources: Microsimulations based on ILCS 2018, MFMod database and MTI projections. *Notes*: All poverty rates are based on the poverty line of USD 3.20 (PPP 2011). Shocks follow the assumptions presented on Table 2. Effects are not mutually exclusive. Households may be affected by multiple types of shocks. The shocks by sector of employment incorporate the channels of unemployment and wage losses for workers in each sector.

The microsimulations also reveal heterogenous effects on income and poverty across location and population groups. Evidence in **Annex A.6.** suggests that secondary urban centers suffer the highest poverty increases (7.2 percentage point increase, compared to 5.1 percentage points at the national level). Yerevan and Sjunik marz face the highest shares of income loss. Rural areas face the lowest impact (6 percent of average income loss, compared to the national average of 9 percent).

The simulations also point at the relevant role of social protection policies in shielding against the economic consequences of the pandemic. For example, preliminary evidence suggests that households receiving pensions and receiving the family benefit may observe lower increases in poverty rates, compared to households not receiving pensions or family benefit (**Figure A.6.b**).

Table 4 shows that 234 thousand Armenians who were not poor before the crisis could become impoverished as a result of the economic impacts of COVID-19. Over 470 thousand Armenians could suffer downward mobility. People in vulnerable households and the middle class could fall to poverty—including extreme poverty in some cases—after the economic loses from the pandemic (**Figure 6**).

Table 4. Number of people suffering impoverishment or downward mobility

	Impoverishment	Downward Mobility
Unemployment	109,623	220,032
Income loss in wages	96,334	171,208
Income loss in agriculture	8,544	12,374
Income loss in remittances	22,934	52,248
Combined effect	**233,892**	**473,407**

Sources: Microsimulations based on the ILCS 2018, MTI projections, and MFMod database (as of February 2020). *Notes:* Impoverishment = People living in households that are nonpoor under business-as-usual, but who become poor after the employment and income shocks of COVID-19. Downward mobility = People living in households that transition to a lower welfare group as a result of the employment and income shocks from COVID-19.

Figure 6. Transition Matrix of welfare status in Armenia

(Number of people)

Welfare status at baseline	Welfare status after the negative shock					
	Extreme poor	Poor	Moderate Poor	Vulnerable	Middle-class	All
Extreme poor	35,795					35,795
Poor	26,718	197,615				224,333
Moderate Poor	12,290	118,072	779,833			910,194
Vulnerable	5,121	9,698	215,069	956,303		1,186,191
Middle-class	1,757	782	1,465	82,436	434,233	520,673
All	81,681	326,166	996,367	1,038,739	434,233	2,877,185

Sources: Microsimulations based on the ILCS 2018, MTI projections and MFMod database. *Notes:* The welfare groups are defined as extreme poor (<USD1.90 international poverty line); poor (<USD3.20 international poverty line); moderate poor (<USD 5.50 international poverty line); vulnerable (<USD 10.00) and middle-class (≥ USD 10.00). All poverty lines are defined in USD 2011 PPP.

More disaggregated microeconomic simulations—assuming heterogenous shocks across 21 subsectors of employment—suggest that the largest source of poverty increases comes from unemployment in retail and tourism, when using the poverty line of USD 3.20 PPP 2011 **(Appendix A.6)**. However, unemployment in retail, construction and manufacturing is more relevant for extreme impoverishment (USD 1.90 PPP 2011 poverty line).

Table 5. Comparison with extended micro simulations for subsectors of employment

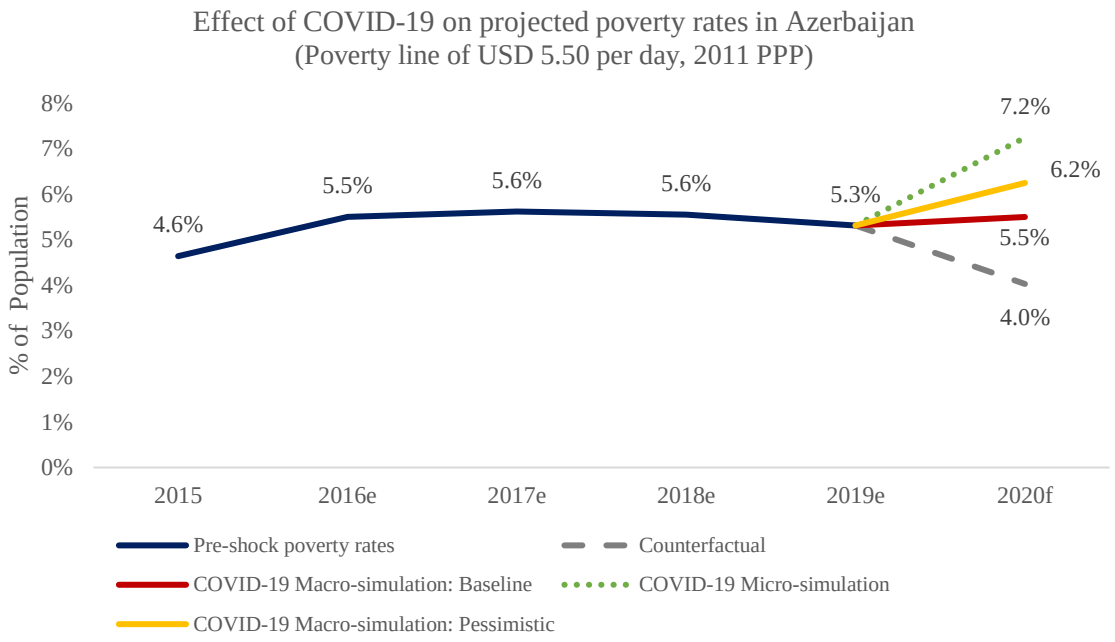
	Headcount poverty rate FGT(0)	Poverty Gap FGT(1)	Poverty Severity FGT(2)
Counterfactual			
Lower middle-income poverty line (USD 3.20 PPP 2011)	9.0	1.9	0.6
National upper poverty line	13.0	3.8	4.2
Micro simulation at the 3-sector level			
Lower middle-income poverty line (USD 3.20 PPP 2011)	14.2	3.9	2.6
National upper poverty line	22.3	4.5	2.1
Extended micro simulation at the 21-subsector level			
Lower middle-income poverty line (USD 3.20 PPP 2011)	13.0	3.8	4.2
National upper poverty line	21.2	4.2	3.1

Sources: Microsimulations based on the ILCS 2018 and MFMod database. *Notes:* Assumptions for the microsimulation at the 3-sector level are summarized in Table 3. Assumptions for the extended microsimulation are included in Appendix A.6. All poverty lines are defined in USD 2011 PPP. The national upper poverty line was ARM 41,612/PAE/month in 2018. It is assumed to keep constant in real terms for 2020.

Results for Azerbaijan

The impact on the poverty rate is sizable under the micro simulation approach. When compared against the counterfactual state, poverty rate in 2020 is expected to increase by 3.21, 2.22 and 1.47 percentage points under the micro and macro (baseline and pessimistic scenarios) approaches respectively (**Figure 7**).

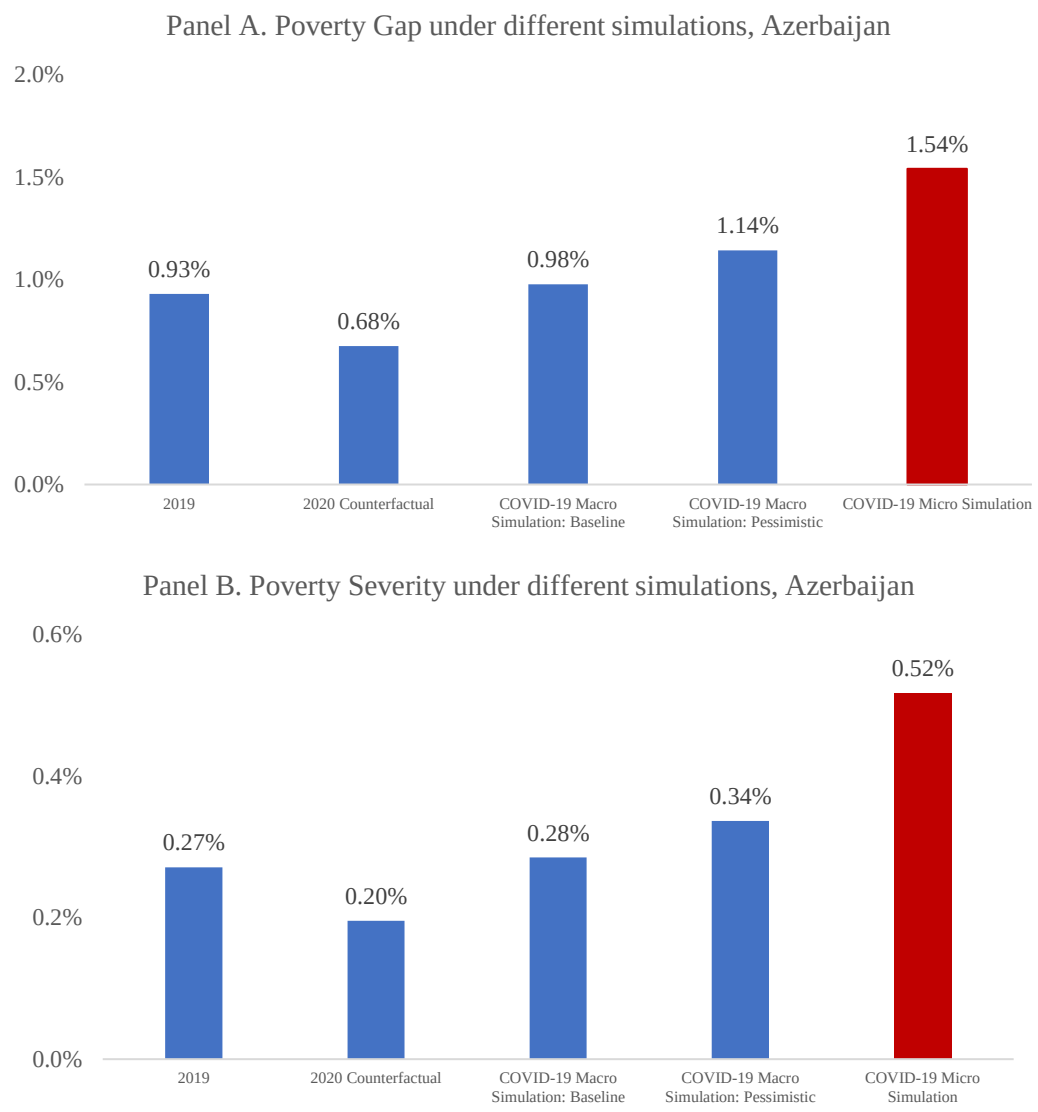
Figure 7. Poverty effects of COVID-19 in Azerbaijan



Sources: AMSSW 2015 and database from MFMod (available from \\gpvfile\GPV\Knowledge_Learning\Pov Projection\Central Team\MFM-allvintages.dta). *Notes*: e = estimate, f = forecast. All poverty estimations based on the upper middle-income poverty line of USD 5.50 (PPP 2011). "Counterfactual" refers to predictions made prior to the outbreak of COVID-19 based on the previous version of MFMod estimates (February 25, 2020). "COVID-19 Macro-simulation: Baseline" is estimated based on GDP projections for 2020 from the MFMod database (dated April 13, 2020). "COVID-19 Macro Simulation: Pessimistic" is based on the GDP growth forecast by the World Bank's country economists (as of May 2020). "COVID-19 (Micro-simulation)" is the estimate from the micro simulation.

Results also show that the increase in poverty rate is associated with growing inequality as reflected in the rise in poverty gap and poverty severity, amplified under the micro simulation approach (**Figure 8**). Compared to the counterfactual case in 2020, the poverty gap increases by 0.86, 0.47 and 0.3 percentage points and severity by 0.32, 0.14 and 0.09 percentage points under the micro and macro simulations (upper- and lower-bounds) respectively.

Figure 8. Projected Effect of COVID-19 on Depth of Poverty in 2020

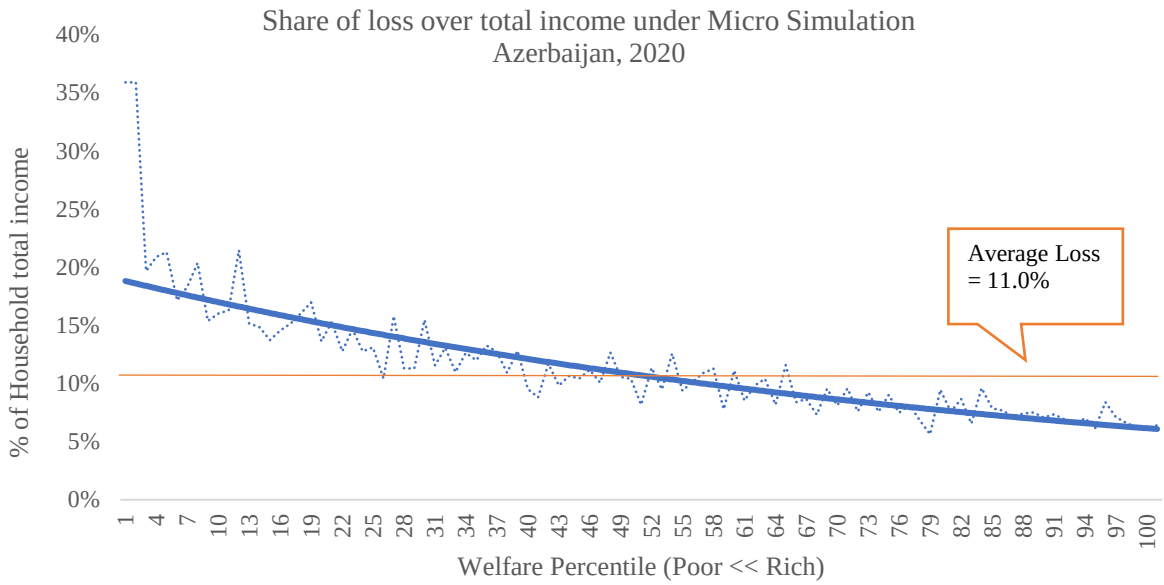


Sources: AMSSW 2015 and database from MFMod (available from \\gpvfile\GPV\Knowledge_Learning\Pov Projection\Central Team\MFM-allvintages.dta). *Notes*: e = estimate, f = forecast. All poverty estimations based on the upper middle-income poverty line of USD 5.50 (PPP 2011). "Counterfactual" refers to predictions made prior to the outbreak of COVID-19 based on the previous version of MFMod estimates (February 25, 2020). "COVID-19 Macro-simulation: Baseline" is estimated based on GDP projections for 2020 from the MFMod database (dated April 13, 2020). "COVID-19 Macro Simulation: Pessimistic" is based on the GDP growth forecast by the World Bank's country economists (as of May 2020). "COVID-19 (Micro-simulation)" is the estimate from the micro simulation.

Larger effects on poverty from the micro simulation are driven by the distributional impact of COVID-19 on income loss, with greater negative shock to poorer households (**Figure 9**). Results indicate that all households are expected to experience negative income shock with average of 11 percent of their total income, and percentiles below 50 experience a relatively larger income shock than the average. Gap between the poor and non-poor are also striking – while the share of loss is 10.22 percent of their total household income among the non-poor, the share is more than twice as high at 21.38 percent among the

poor (not shown in the figure). Other dimensions of distributional impact include: spatial gap – with larger share of loss among households in the urban areas (concentrated in Baku and Absheron region) compared to rural; and across social economic status – with larger loss among the non-beneficiaries of targeted social assistance compared to the beneficiaries, for example (**Figure A.7.a. in the Annex**). The findings are partially driven by the gap in diversification in income source, with higher percentage of households relying on income from sole employment sector in urban area (**Figure A.7.b. in the Annex**).

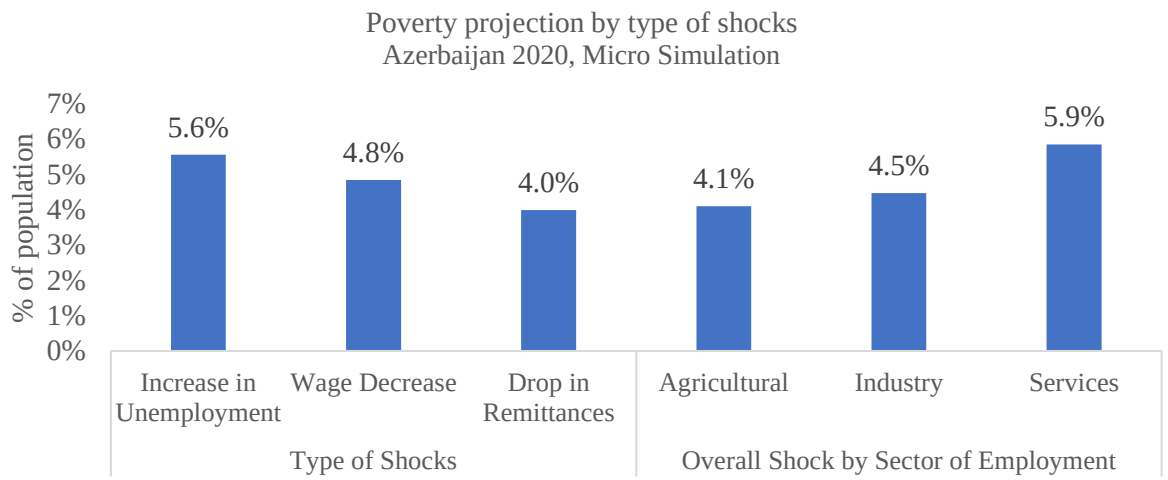
Figure 9. Distributional incidence of income losses related to COVID-19



Sources: AMSSW 2015 and database from MFMod (available from \\gpvfile\GPV\Knowledge_Learning\Pov Projection\Central Team\MFM-allvintages.dta). *Notes*: Shown are the results of the micro simulation. Under the macro simulation, the impact will be constant across all households. Estimates are population weighted. Welfare percentile is based on the projected consumption aggregate under the micro simulation for 2020.

In the case of Azerbaijan, overall shock in the services sector (including layoffs and decrease in wage) contributes the most to the increase in poverty, followed by the increase in unemployment across all sectors (**Figure 10**).

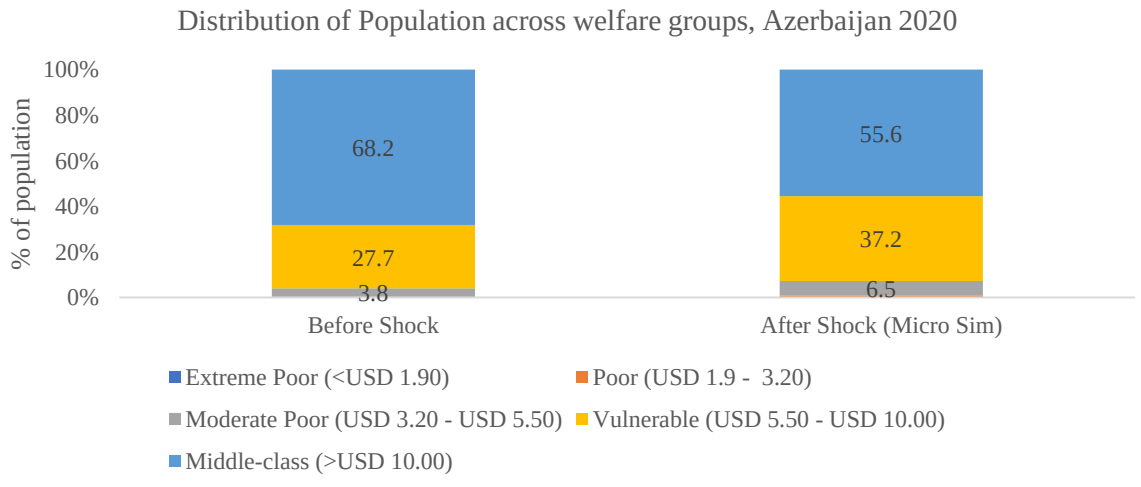
Figure 10. Projected poverty rates by type of shocks in 2020



Sources: AMSSW 2015 and database from MFMod (available from \\gpvfile\GPV\Knowledge_Learning\Pov Projection\Central Team\MFM-allvintages.dta). *Notes*: All poverty estimations based on the upper middle-income poverty line of USD 5.50 (PPP 2011). *Note*: Shown are the results of the micro simulation. These shocks are not mutually exhaustive. Multiple types of shocks can impact each household.

Micro simulation result shows that COVID-19 crisis would not only increase the poverty rate but would also yield significant expansion of the vulnerable group. **Figure 11** shows that 1.05 million people who belonged to the middle-class before the crisis would fall into vulnerable class. Moreover, 2.83 percent of the population, or approximately 235,200 people who were in vulnerable group will fall back into poverty due to the crisis. The finding suggests that, despite the country's progress in poverty reduction, many people in Azerbaijan still live in vulnerability, just one shock away from losing the gains they managed to obtain after several years of hard work.

Figure 11. Mobility of the population

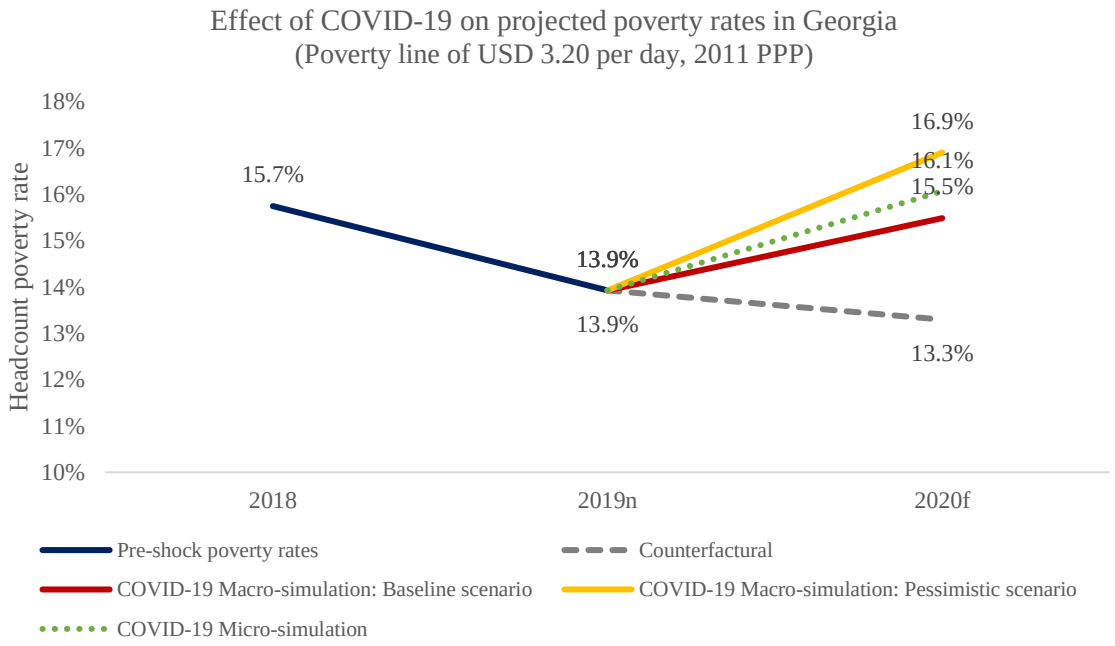


Sources: AMSSW 2015 and database from MFMod (available from \\gpvfile\GPV\Knowledge_Learning\Pov Projection\Central Team\MFM-allvintages.dta). *Notes:* All poverty lines are expressed in USD 2011 PPP.

Results for Georgia

The pessimistic macroeconomic scenario in Georgia (assuming negative growth rate of -7.5) results in the highest poverty increase of 3.6 percentage points, with respect to the counterfactual of 13.3 percent poverty rate in 2020. The micro simulation exercise projects a more modest increase of 2.2 percentage points in poverty (**Figure 12**).

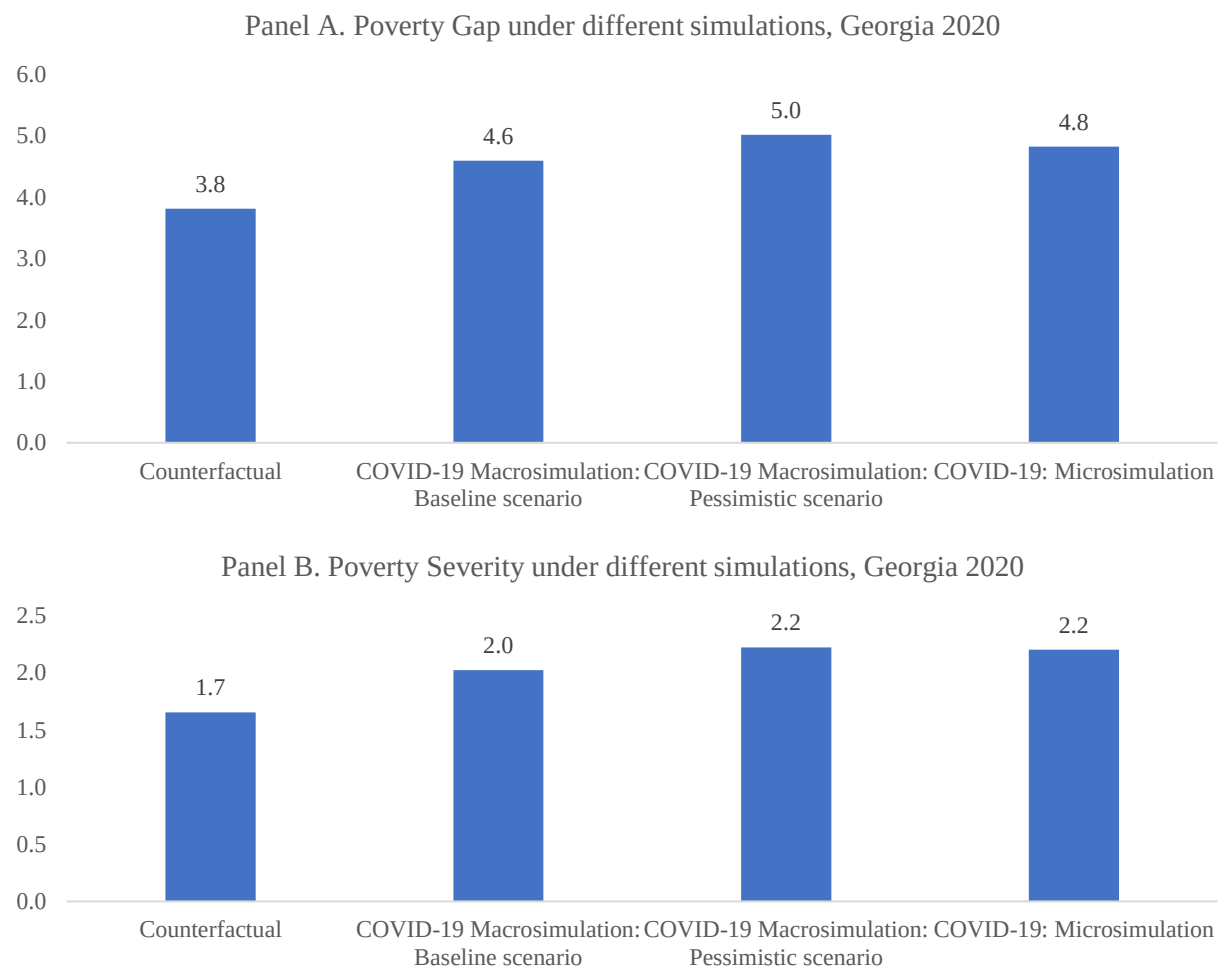
Figure 12. Poverty effects of COVID-19 in Georgia



Sources: HIES 2018, MFMod database and projections from MTI. *Notes:* n = nowcast, f = forecast. The counterfactual scenario is based on business-as-usual GDP forecasts from MFMod (as of February 25, 2020). The baseline and pessimistic macro simulations assume GDP growth of -4.0 percent and -7.5 percent, respectively, for Georgia in 2020.

Under all simulations, the poverty gap and poverty severity indicators increase with the economic consequences linked to the pandemic (**Figure 13**). Results from the microsimulations are similar in magnitude to the pessimistic macro simulations.

Figure 13. Projected Effect of COVID-19 on Depth of Poverty in 2020



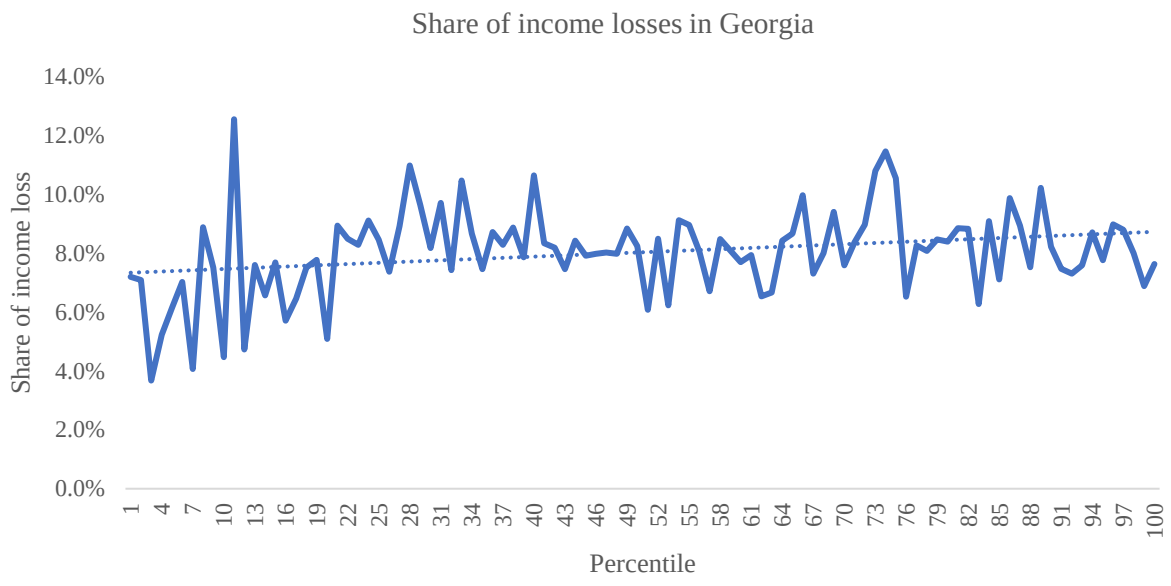
Sources: Microsimulations based on the HIES 2018 and database from MFMod. Macrosimulations based on data from the MFMod database, WEO (April 2020) and MTI projections. *Notes:* The macroeconomic baseline scenario assumes GDP growth rate of -4.0% in 2020. The macroeconomic pessimistic scenario assumes that GDP drops at -7.5% change rate in 2020. The microsimulations assign different sectoral income and unemployment shocks described in Table 3.

On average, income losses from COVID-19 represent 8.0 percent of household incomes in Georgia (**Figure A.8.a**). However, the shares of income losses do not show a clear distributional pattern across percentiles of the population (**Figure 14**). The share of income losses is highest in Tbilisi (10.6 percent) and lowest in rural areas (5.1 percent share) (**Figure A.8.a**).

The increased probability of job loss is the main driver of poverty increases after COVID-19. The loss of wage incomes among remaining workers is the second driver. The poverty effects through agricultural sales and remittance inflows remains more subdued (**Figure 15**). The employment and income shocks to the services sector yield the largest marginal increase in poverty. This is confirmed in the extended microsimulation model presented in the Appendix. Unemployment and income shocks to workers in

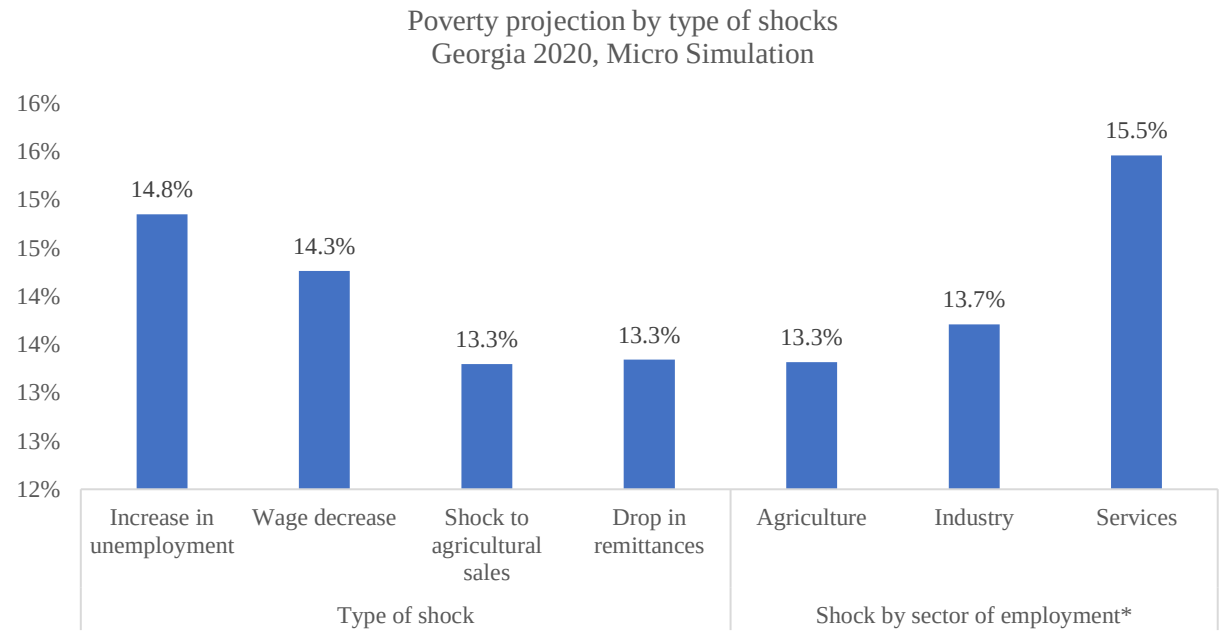
wholesale and retail trade, tourism, and construction, have the largest marginal effects on poverty and extreme poverty (**Figure A.8.c**).

Figure 14. Distributional incidence of income losses related to COVID-19



Sources: Microsimulations based on the HIES 2018 and the MFMod database. *Note*: Welfare percentile is based on the projected consumption aggregate under the micro simulation for 2020.

Figure 15. Effects of micro-simulation on poverty rates



Sources: Microsimulations based on the HIES 2018 and database from MFMod (as of February 2020). Effects are not mutually exclusive. The shocks by sector of employment incorporate only the channels of unemployment and wage losses in each sector.

Residents of Tbilisi, households with larger number of children, and households not reporting pension incomes will most likely face higher probabilities of unemployed. Interestingly, households reporting income from social assistance in the HIES 2018, and those estimated to be TSA-eligible observe the lowest increase in the poverty rate (**Figure A.8.b**).

Half a million Georgians are at risk of suffering downward mobility, transitioning to a lower-welfare group as a result of COVID-19 in 2020. Over 200 thousand people who were nonpoor before the crisis could become impoverished (**Figure 16** and **Table 6**) Higher unemployment resulting from the pandemic would be the main driver of impoverishment.

Figure 16. Transition Matrix of welfare status in Georgia

(Number of people)

Welfare status at baseline	Welfare status after the negative shock					
	Extreme poor	**Poor**	**Moderate Poor**	**Vulnerable**	**Middle-class**	**All**
Extreme poor	134,913					134,913
Poor	36,135	324,842				360,977
Moderate Poor	3,864	95,967	812,968			912,800
Vulnerable	422.6382	2,539	202,199	1,131,458		1,336,618
Middle-class		580.4675	3626.929	159,168	820,949	984,325
All	175,335	423,929	1,018,794	1,290,626	820,949	3,729,633

Sources: Microsimulations based on the HIES 2018 and MFMod database (as of February 2020). *Notes:* The welfare groups are defined as extreme poor (<USD1.90 international poverty line); poor (<USD3.20 international poverty line); moderate poor (<USD 5.50 international poverty line); vulnerable (<USD 10.00) and middle-class (≥ USD 10.00). All poverty lines are defined in USD 2011 PPP.

Table 6. Number of people suffering impoverishment or downward mobility

	Impoverishment	**Downward Mobility**
Unemployment	119,852	277,242
Income loss in wages	80,759	197,701
Income loss in agriculture	4,372	8,415
Income loss in remittances	7,680	18,456
Combined effect	**209,368**	**504,502**

Sources: Microsimulations based on the HIES 2018 and MFMod database (as of February 2020). *Notes:* Impoverishment: People living in households that are nonpoor under business-as-usual, but who become poor after the employment and income shocks of COVID-19. Downward-mobility: People living in households that transition to a lower welfare group as a result of the employment and income shocks from COVID-19.

Table 7 presents results from the extended microsimulation exercise. Incorporating more granular information at the subsector of employment and imposing more detailed shocks (described in **Annex A.3**) does not shift microsimulation results substantially (with respect to micro simulations at the 3-sectoral level). The forecasted poverty rates using the extended micro simulation are 16.6 percent under the lower middle-income class poverty line, and 20.4 for the national absolute poverty—representing an increase of 3.3. and 3.8 percentage points, respectively.

Table 7. Comparison with extended micro simulations for subsectors of employment

	Headcount poverty rate FGT(0)	Poverty Gap FGT(1)	Poverty Severity FGT(2)
Counterfactural			
Lower middle-income class poverty line (USD 3.20 PPP 2011)	13.3	3.8	1.7
National absolute poverty line	16.6	4.7	2.0
Micro simulation at the 3-sector level			
Lower middle-income class poverty line (USD 3.20 PPP 2011)	16.1	4.8	2.2
National absolute poverty line	21.2	6.4	3.0
Extended micro simulation at the 21-sector level			
Lower middle-income class poverty line (USD 3.20 PPP 2011)	16.6	4.7	2.0
National absolute poverty line	20.4	6.2	2.9

Sources: Microsimulations based on the HIES 2018 and MFMod database. *Notes:* Assumptions for the microsimulation at the 3-sector level are summarized in Table 3. Assumptions for the extended microsimulation are included in Appendix A.6. All poverty lines are defined in USD 2011 PPP. The national absolute poverty line was GEL 152.7/PAE/month in 2018. It is assumed to keep constant in real terms for 2020.

IV. Conclusion

The extent and severity to which the COVID-19 pandemic will impact the poor and vulnerable are still unknown, but it may have lasting and distributional impact in the South Caucasus. This note is intended to present a short-term impact based on the assumptions derived from the latest evidence and offers the range of impacts based on the two approaches – (1) macro-level simulations based on the latest macroeconomic forecasts assuming equal impact on all households, and (2) micro-level simulations that capture distributional impacts and heterogenous effects by assessing possible transmission channels to household income. Given the large variation and uncertainty in macroeconomic forecasts, the analysis takes a baseline as well as a more pessimistic projection to establish the bounds for the macro simulations.

Among the approaches and assumptions adopted, projections under the micro simulations are more pessimistic, projecting 5.2, 3.2, and 2.8 percentage points increase in poverty rates compared to the

counterfactual state (without COVID-19 crisis impact) in Armenia, Azerbaijan and Georgia respectively in 2020. Results from the macro simulations show that the impact on poverty rate in the short-run may be modest, ranging from the increase of 2.2 to 3.9 percent points in Armenia, 1.5 to 2.2 percentage points in Azerbaijan, and 2.2 to 3.6 percentage points in Georgia in 2020 all against the counterfactuals.

This surge in poverty under the micro simulation approach appears to be driven mainly by the impact of layoffs and losses in wage incomes in the services sector, in the three countries.

Importantly, results from the micro simulation warn of a significant distributional impact of the COVID-19 crisis with larger negative impact on the poor. By incorporating transmission channels of employment, income and remittances into the model, micro simulation captures the distributional consequences of the COVID-19 crisis unlike the macroeconomic approach that assumes equal shock to all households.

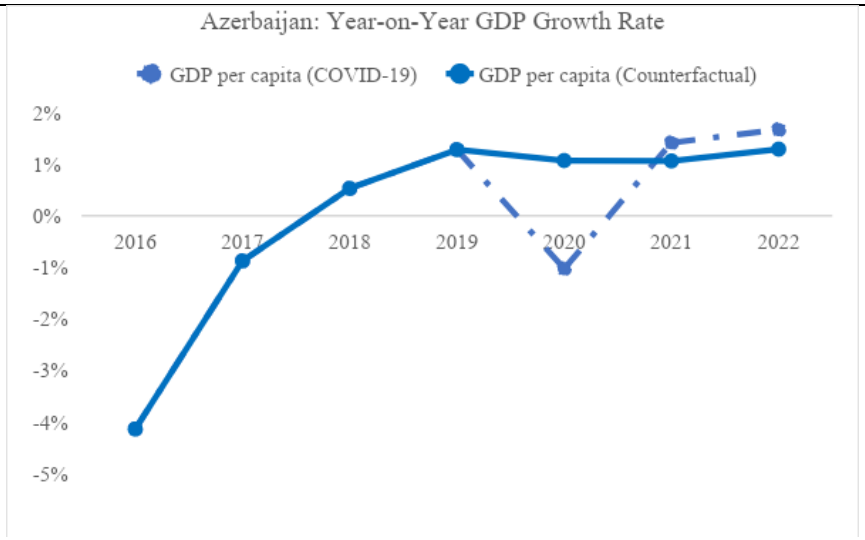
The rise in poverty and distributional impact under the micro simulation approach are associated with growing inequality as reflected in the rise in poverty gap and poverty severity - increase of 2.0 and 2.0 percentage points in Armenia, 0.9 and 0.3 percentage points in Azerbaijan, and 1.0 and 0.5 percentage points in Georgia in 2020 against the counterfactual cases without the COVID-19 impact for poverty gap and severity respectively. These impacts on inequality measures are substantially higher than the estimates based on macro simulations, suggesting important policy implications to addressing rising inequality in the region.

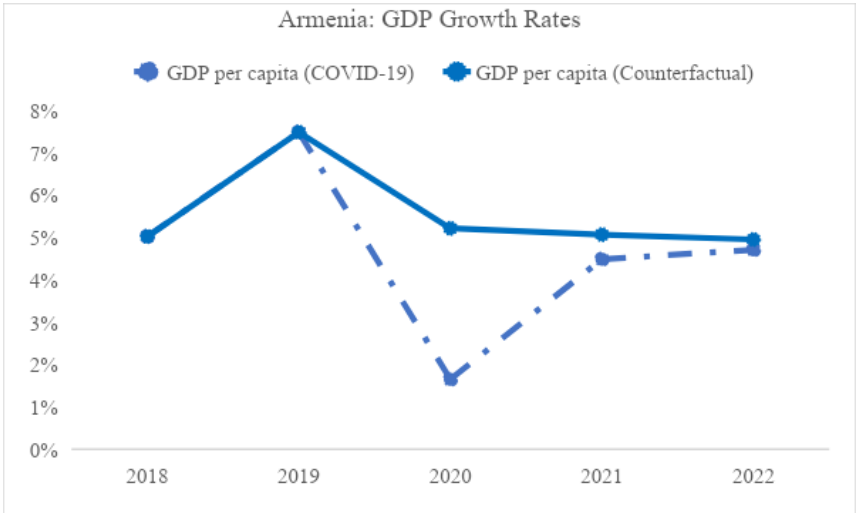
The overall effects can be far larger than our analysis predicts. In the note, the micro simulation approach which yields the most pessimistic projection among the alternatives, assumes that the pandemic fades in the second quarter of 2020, which can be revised in the next round of analysis. Additional assumptions, such as second-order effects through changes in consumption behavior, occupational choices, or impact of various mitigation policy measures, can also be incorporated to finetune the model. The outbreak is moving quickly and some of the results presented here may soon become outdated. The model and assumptions can be refined, and the analysis shall be updated regularly as the crisis evolves and the new data becomes available.

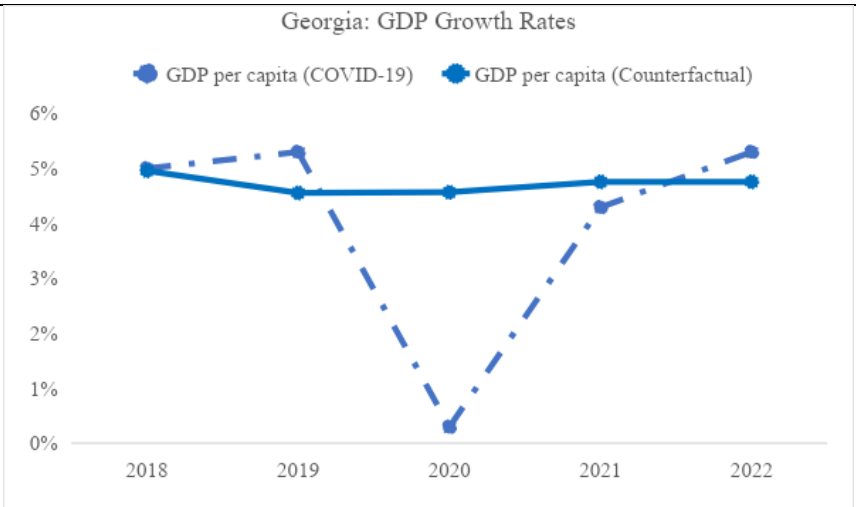
V. Annex

A.1. Real GDP growth rate from MFMod database used in Macro simulations

Figure A.1.a. GDP Per Capita Growth - Projection for Armenia, Azerbaijan, and Georgia







Source: MFMod Database available from \\gpvfile\GPV\Knowledge_Learning\Pov Projection\Central Team\MFM-allvintages.dta. *Note*: GDP per capita ratios are calculated in real terms with 2015 figure used as a base. Ratios of "Covid-19" are the COVID-19 impacted forecasts based on the latest figures estimated on April 13, 2020, while those of "Counterfactual" are forecasts from the previous set of figures estimated on February 25, 2020.

A.2. Methodology for Nowcasting household's consumption aggregates using GDP ratios

For all three countries of the South Caucasus, the first step was to nowcast households' welfare in 2019 using the latest available household surveys. In case of Azerbaijan, household's annual consumption aggregates from 2015 AMSSW in 2015 in LCU (Manat) were first deflated to 2011 PPP as follows:

$$C_{2015,ppp} = C_{2015}/CPI_{2011}/ICP_{2011}\ /365 \qquad (1)$$

where

$C_{2015,ppp}$ is per capita consumption aggregate per day in 2015, converted to USD in terms of 2011 PPP,

C_{2015} is the annual per capita consumption aggregate in 2015 in LCU (Manat),

CPI_{2011} and ICP_{2011} are CPI and PPP respectively to convert into 2011 PPP.

Using household's welfare in 2015 in terms of 2011 PPP ($C_{2015,ppp}$) as the base, the ratio of GDP per capita in year 2015 to GDP per capita in year *y* is applied to inflate household's welfare by applying pass-through rates as follows:

$$C_y^r = C_{2015,ppp} * \ (1 + (g_y * r)) \qquad (2)$$

where

C_y^r is the household's consumption aggregate in year *y* in 2011 PPP terms under pass-through rate of *r*,

$g_y$is the ratio of real GDP per capita between 2015 and year *y* $(= GDP_{PC}^{y}/GDP_{PC}^{2015} - 1)$, and

r is the pass-through rate.

Throughout the analysis, high level pass-through rate of r=1.0 is used for the simulation.

Using equation (2), two sets of C_y^r are extrapolated based on two different versions of GDP_{PC}^{y}: (a) GDP per capita forecasts from the latest version as of April 2020, and (b) GDP per capita forecasts from the previous version from February 2020, both obtained from the macro projection databases from MFMod. Note that the projections described in (a) are expected to incorporate COVID -19 impacts while projections in (b) serve as a counterfactual cases estimated prior to COVID-19 outbreak.[11] By comparing these COVID-19 impacted forecasts with the forecasts from the previous version of MFMod in February 2020 allows for an assessment of the impact of the pandemic on poverty. The assumption underlying this approach is that country's growth and welfare improvement accrue equally to all and that COVID-19 does not change inequality within countries.

A.3. Methodology for Micro simulations

Forecasting household consumption

Based on the assumptions made for the micro simulation, households' income in year *2020* is projected as follows:

$$H^{2020sim} = \sum_m \sum_s I_{m,s}^{y} = \sum_m \sum_s \left\{ I_{m,s}^{y} \times I\left(1 + g_s^{y}\right) \right\}, \qquad (3)$$

where

$H^{2020sim}$ is the household *H*'s income simulated for year *2020*,

m is the member *m* within household *H*,

s is the sector in which the member *m* is employed in the latest household survey in year *y*,

$I_{m,s}^{y}$ is the income of member *m* from sector *s* in the latest household survey in year *y*,

I is a dichotomous indicator equal to 1 if employed and 0 otherwise based on the scenario,

[11] This approach is identical to that adopted for Sub Saharan Africa by the team at the World Bank (https://blogs.worldbank.org/opendata/impact-covid-19-coronavirus-global-poverty-why-sub-saharan-africa-might-be-region-hardest).

g_s^y is the percentage change of income from sector *s* in 2020 based on micro-simulation scenario.

Then household *H*'s income growth (or ratio of simulated income to the counterfactual income without the shock) is used as a factor to deflate household *H*'s consumption welfare:

$$C_H^{2020\,sim} = C_H^{2020} \times \left(H^{2020sim}/H^y\right) \qquad (4)$$

where

C_H^{2020} is household *H's* welfare (or, consumption aggregate) without the shock projected in year *2020*,

H^y is the household *H*'s income in year *y* without the shock, and

$H^{2020sim}$ is the simulated household income from equation (3).

Transmission channels of COVID-19

(1) Shock on employment

- ***U_s%*** of wage workers in sector of employment ***s*** become unemployed, as a result of the COVID-19 crisis.
    - The unemployment shock is randomly assigned across waged workers, within sector *s*.
    - Both hired employees and self-employed workers can be potentially laid-off. Non-waged workers (*e.g.* workers in private family farms) may not be laid-off. Though waged workers in agriculture may have positive probability of becoming unemployed.
    - Unemployed workers suffer a **100% wage income loss** during ***t*** months.

(2) Shock on wage incomes and agricultural sales

- All remaining workers lose **W_s%** of their incomes, as a result of the COVID-19 crisis.
    - The remaining wage workers encompass (1- U_s)% of wage workers in each sector.
    - These workers suffer a W_s% loss of their pre-shock **wage incomes.**
    - **agricultural sales**, during ***t*** months.

(3) Shock on remittances

- Household income from remittances is assumed to fall by **Y%** during the period *t*.

Poverty estimations

- The (1) employment and (2) income shocks are calculated for all workers in the sample, based on their sector of employment.
- The total income loss is aggregated at the household level. The household income loss is then subtracted from the harmonized consumption aggregates.
- Poverty is calculated using:
    - (a) The lower middle-income class **poverty line of USD 3.20 (PPP 2011)** per capita per day (Armenia and Georgia) or the upper middle-income class poverty line of **USD 5.50 (PPP 2011)** per capita per day (in Azerbaijan).
    - (b) The **national absolute poverty line**s whenever possible.
- Poverty rates under business-as-usual (counterfactual of no COVID-19 shock) are compared to ex-post COVID-19 scenarios.
- The number of people suffering impoverishment and downward mobility as a result of the COVID-19 crisis are calculated:
    - **Impoverishment**: People living in households that are nonpoor under business-as-usual, but they become poor after the employment and income shocks of the COVID-19 emergency.
    - **Downward**-mobility. People living in households that are transition to a lower welfare group as a result of the employment and income shocks from COVID-19.[12]

[12] The welfare groups are defined as: extreme poor (<USD1.90 international poverty line); poor (<USD3.20 international poverty line); moderate poor (<USD 5.50 international poverty line); vulnerable (<USD 10.00) and middle-class (≥ USD 10.00). All poverty lines are defined in USD 2011 PPP.

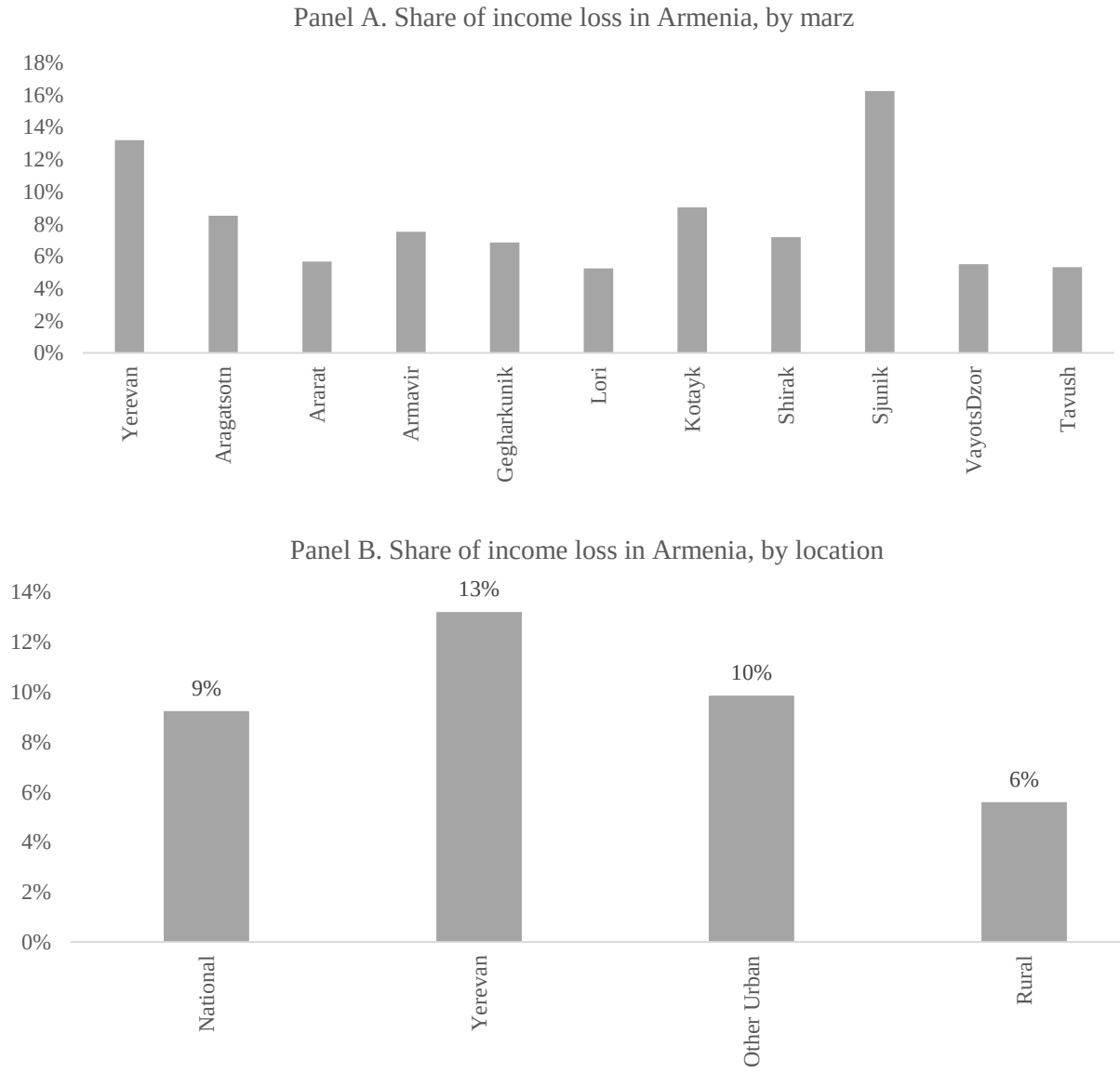
A.5. Assumptions for extended Micro simulations on subsectors of employment

Sector	Subsector (NACE Rev 2)	Probability of unemployment (Probability)	Income shock on remaining wage workers (% wages)	Note
Agriculture	Agriculture, forestry, fishing	0	10	Includes wages and agricultural sales
Industry	Mining and Quarrying	20	20	
	Manufacturing	20	20	
	Electricity, gas, steam and conditioning	0	0	
	Water supply, sewerage, waste management	0	0	
	Construction	20	20	
Services	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	50	50	
	Transportation and storage	50	50	
	Accommodation and Food Service Activities	50	50	Absorbed into tourism
	Information and communication	20	20	
	Financial and Insurance Activities	0	0	
	Real Estate Activities	20	20	
	Professional, scientific and technical	20	20	
	Administrative and Support Service	20	20	
	Public Administration and defense	0	0	
	Education	0	0	
	Human Health and Social Work	0	0	
	Arts, Entertainment and Recreation	50	50	Partially absorbed into tourism
	Other service activities	30	30	
	Activities of households as employers;	50	50	
	Activities of extraterritorial organizations	0	0	
	Tourism*	50	50	

Notes: The tourism sector is our own definition based on the most disaggregated data available (4-digit codes of the Statistical classification of economic activities in the European Community, NACE REV.2). Workers in tourism are defined as those with economic activities in accommodation and food services; select transport activities; activities; activities of travel agencies; and select recreational, cultural and sporting activities.

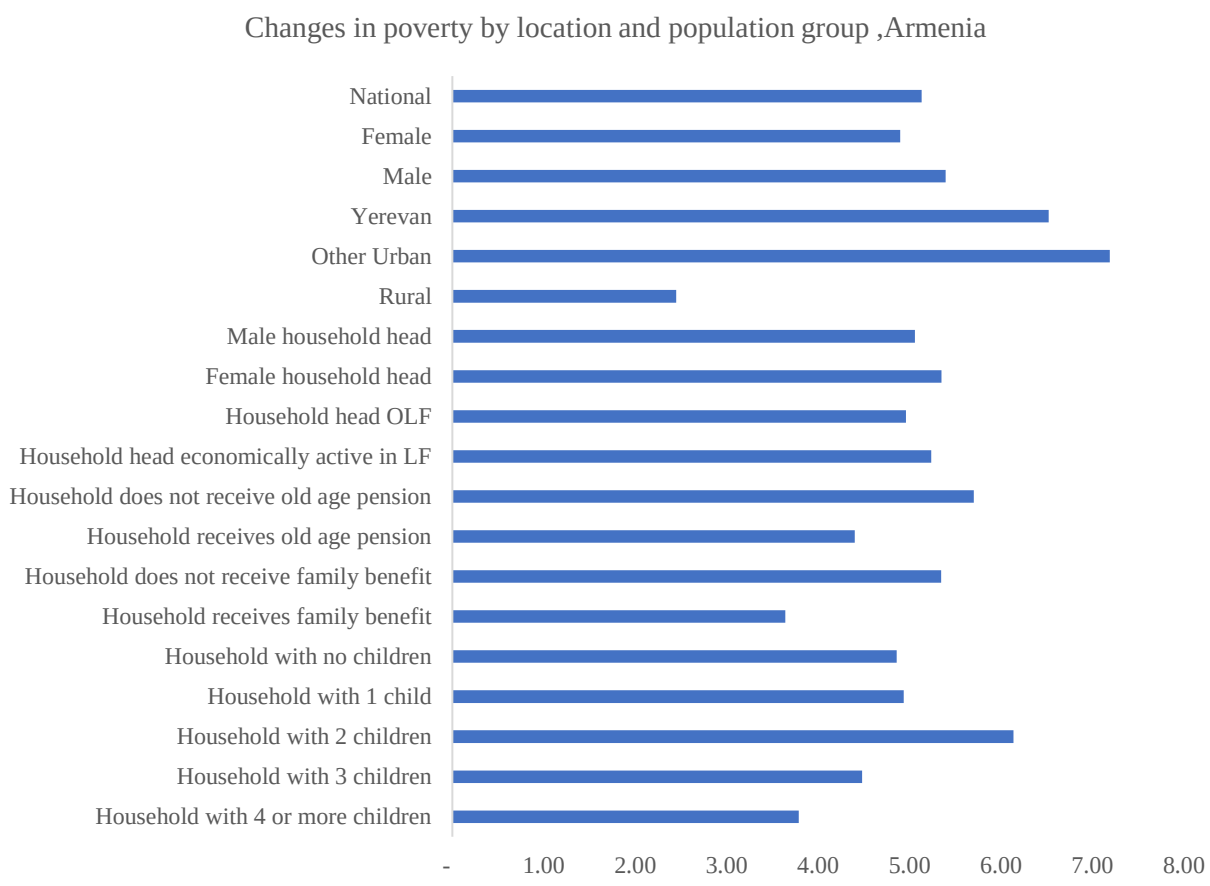
A.6. Additional welfare and distributional micro-level analysis in Armenia

Figure A.6.a. Impact by Location



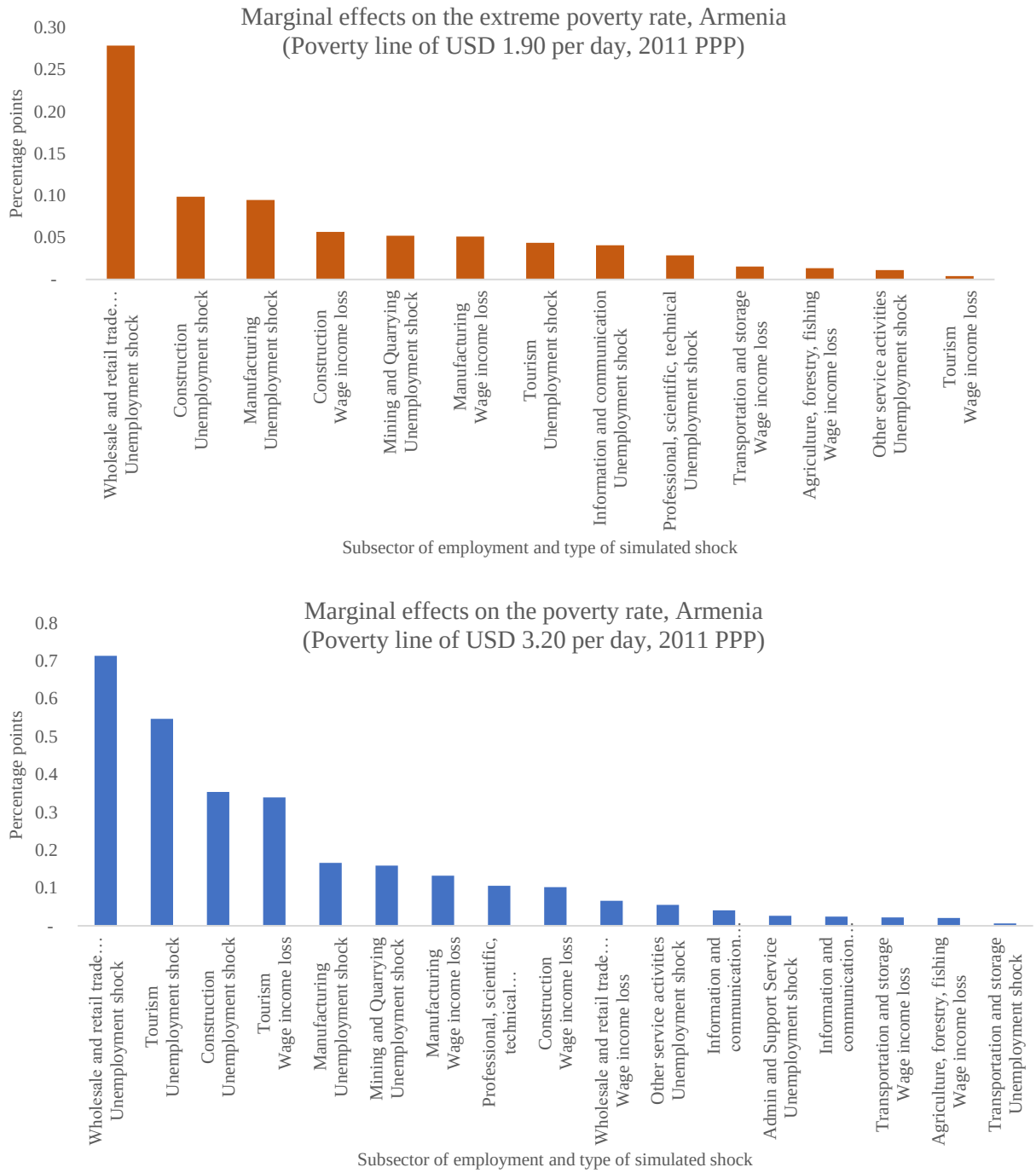
Source: Microsimulations based on the ILCS 2018. The counterfactual scenario for 2020 is forecasted based on business-as-usual macroeconomic projections by the MTI GP (February 2020). Income is proxied by the household per capita consumption aggregate.

Figure A.6.b. Heterogeneity analysis of poverty changes



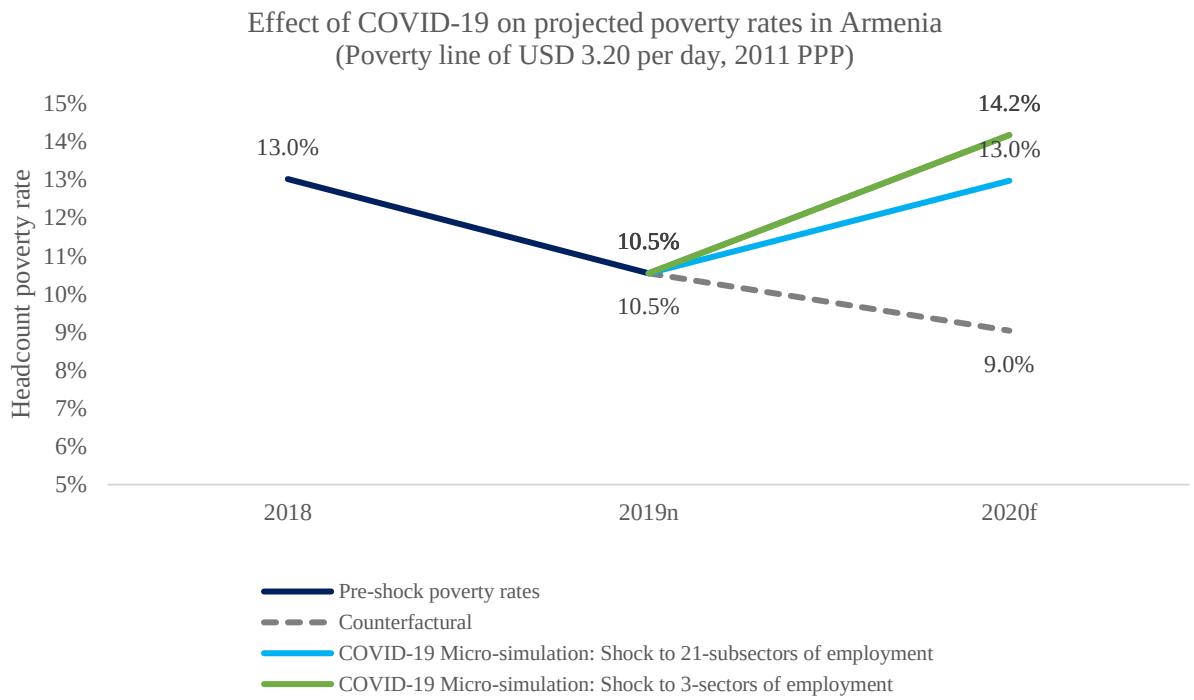
Source: Microsimulations based on the ILCS (2018). *Notes:* Headcount poverty rates based on the USD 3.20 poverty line (2011 PPP). The counterfactual scenario for 2020 is calculated based on business-as-usual macroeconomic projections by the MTI GP (end of April 2020).

Figure A.6.c. Marginal effects on poverty changes by subsector of employment and income shock



Source: Microsimulations based on the HIES (2018) and assumptions of subsector-level shocks presented in Appendix A.5.
Notes: Changes with respect to a counterfactual scenario for 2020, calculated based on business-as-usual macroeconomic projections by the MTI GP (February 2020). Poverty rates based on the international poverty line of USD 3.20 (2011 PPP). All subsectors of employment are reclassified to match the NACE Rev.2 classification. Tourism is defined by the authors to include accommodation and food services, selected transportation services, activities of travel agencies, and selected arts, entertainment and recreational activities. Only the subsectors and shocks with largest marginal impact on the poverty rate are shown.

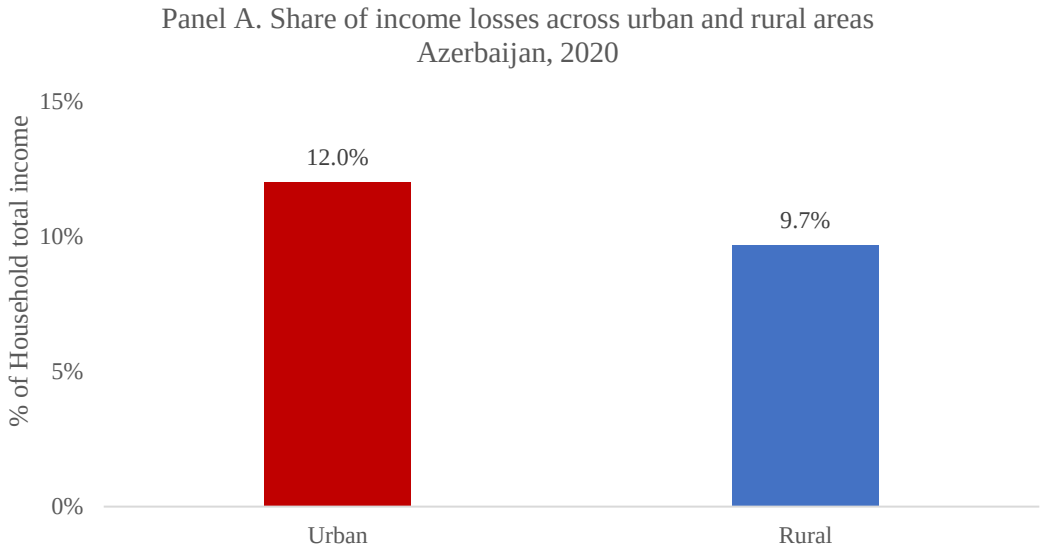
Figure A.6.d. Comparison of microsimulations at the sector and subsector level

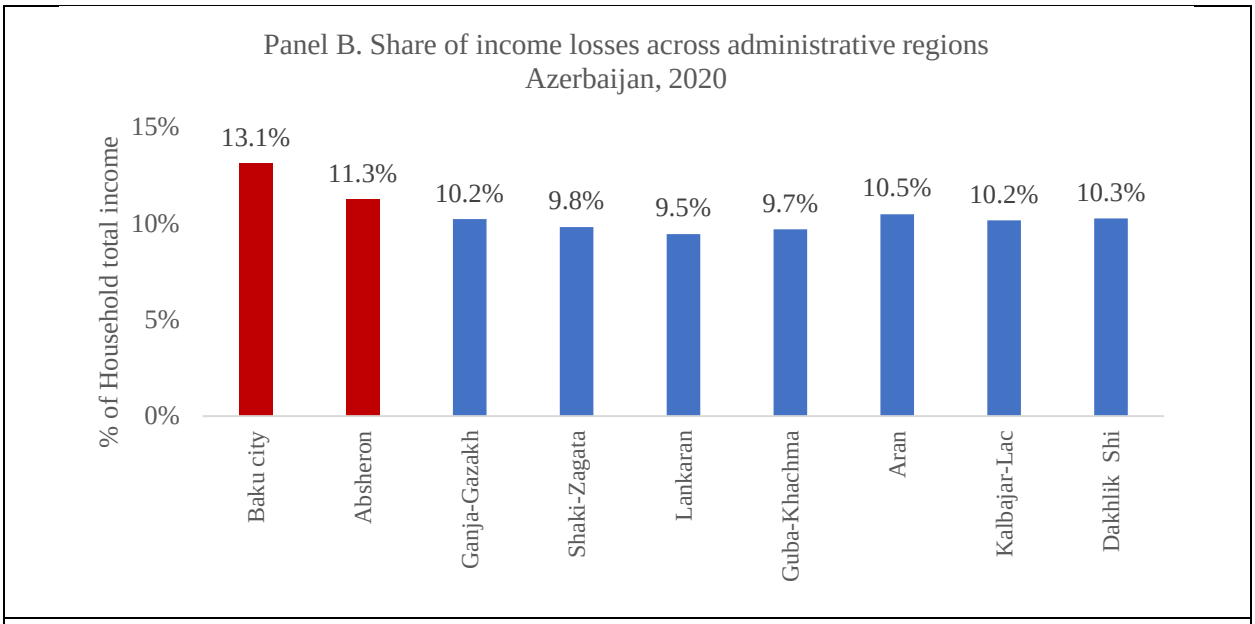


Source: Microsimulations based on the ILCS (2018) and assumptions of subsector-level shocks presented in Appendix A.5.
Notes: N: Nowcasted. F: Forecasted.

A.7. Additional welfare and distributional micro-level analysis in Azerbaijan

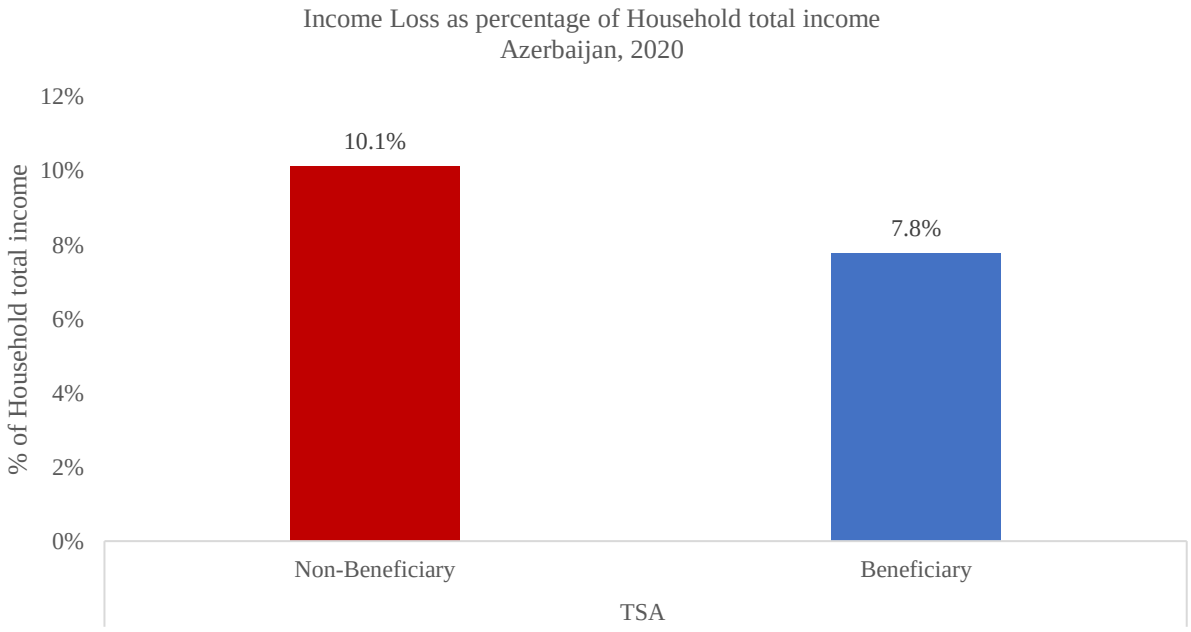
Figure A.7.a. Impact by Location





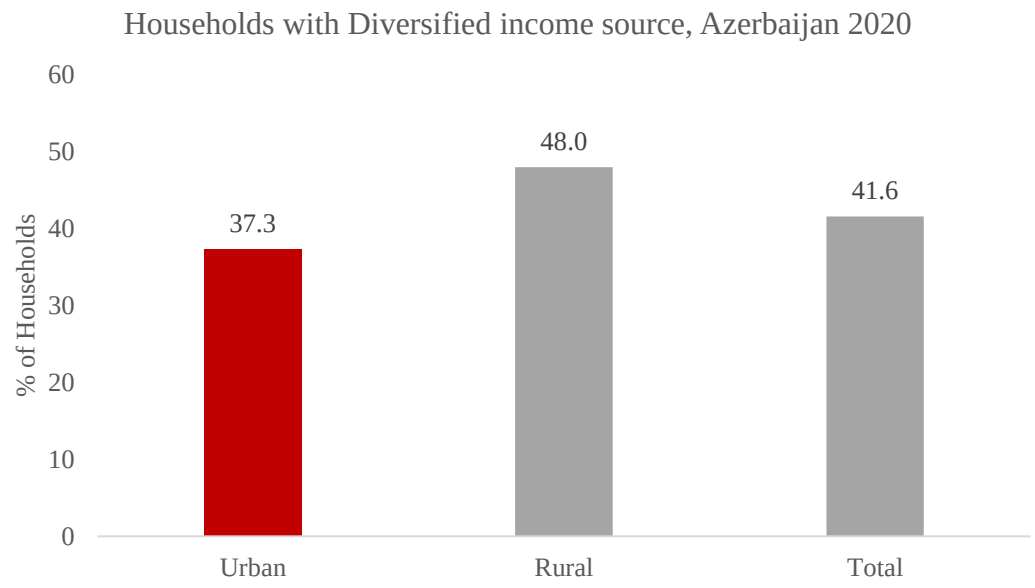
Source: AMSSW 2015. *Note*: Estimates from the micro-simulation.

Figure A.7.b. Impact by TSA beneficiary status



Source: AMSSW 2015. *Note*: Estimates from the micro-simulation.

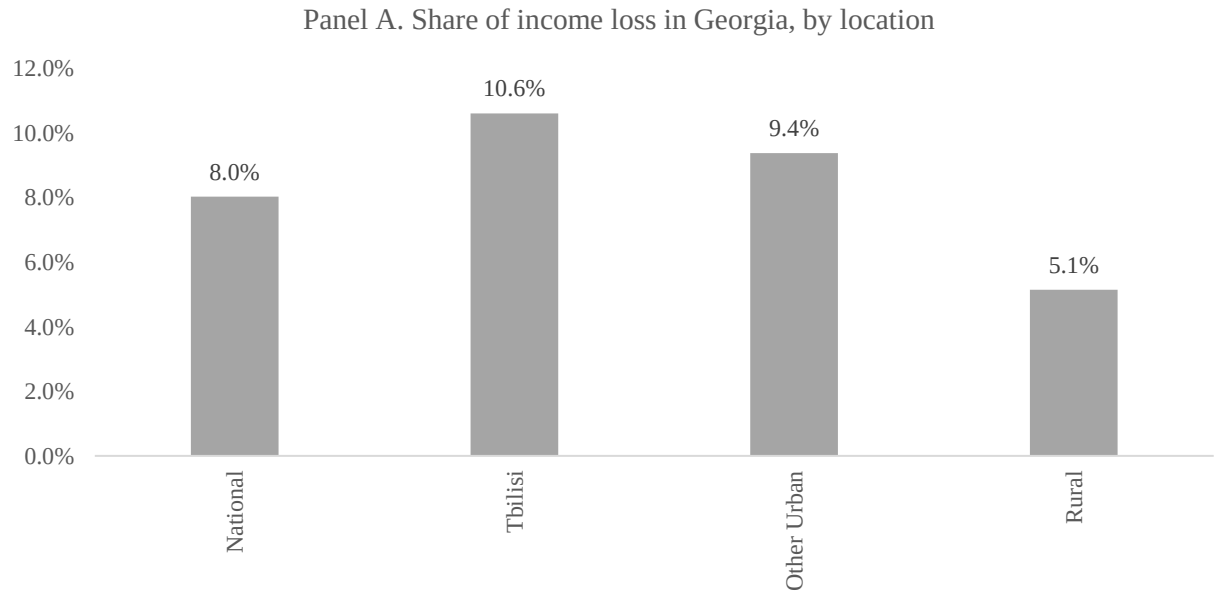
Figure A.7.c. Diversification of Income

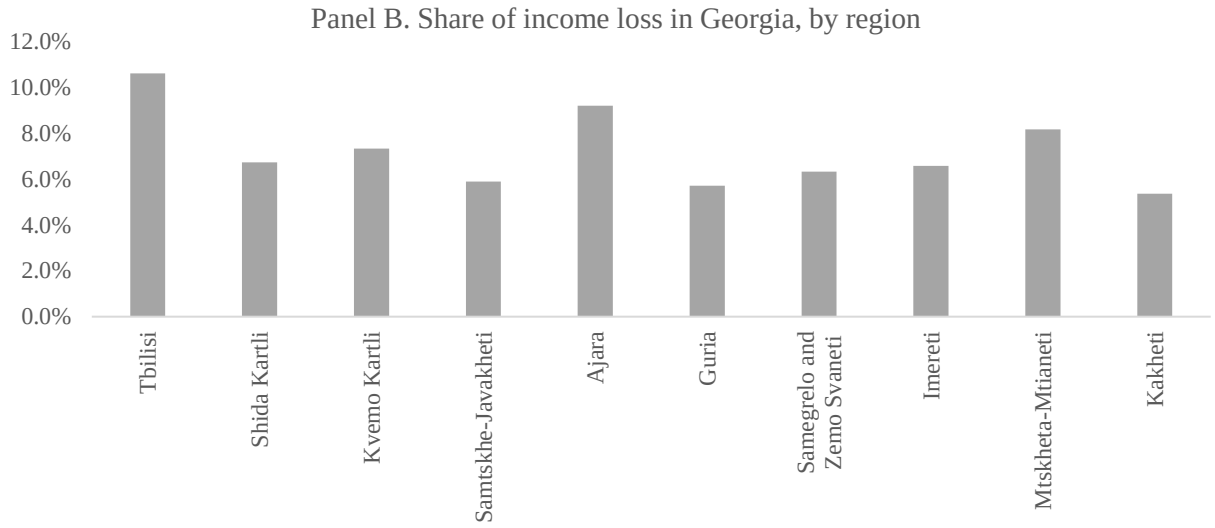


Source: AMSSW 2015. *Notes*: Estimates from the micro-simulation. Households with income from more than one sector (agriculture, industry or services) are defined to have diversified income source. Type of employment (formal/informal or full-time/part-time, etc.) is not considered for the analysis. Difference between urban and rural is statistically significant at 0.00%. Weighted by household.

A.8. Additional welfare and distributional micro-level analysis in Georgia

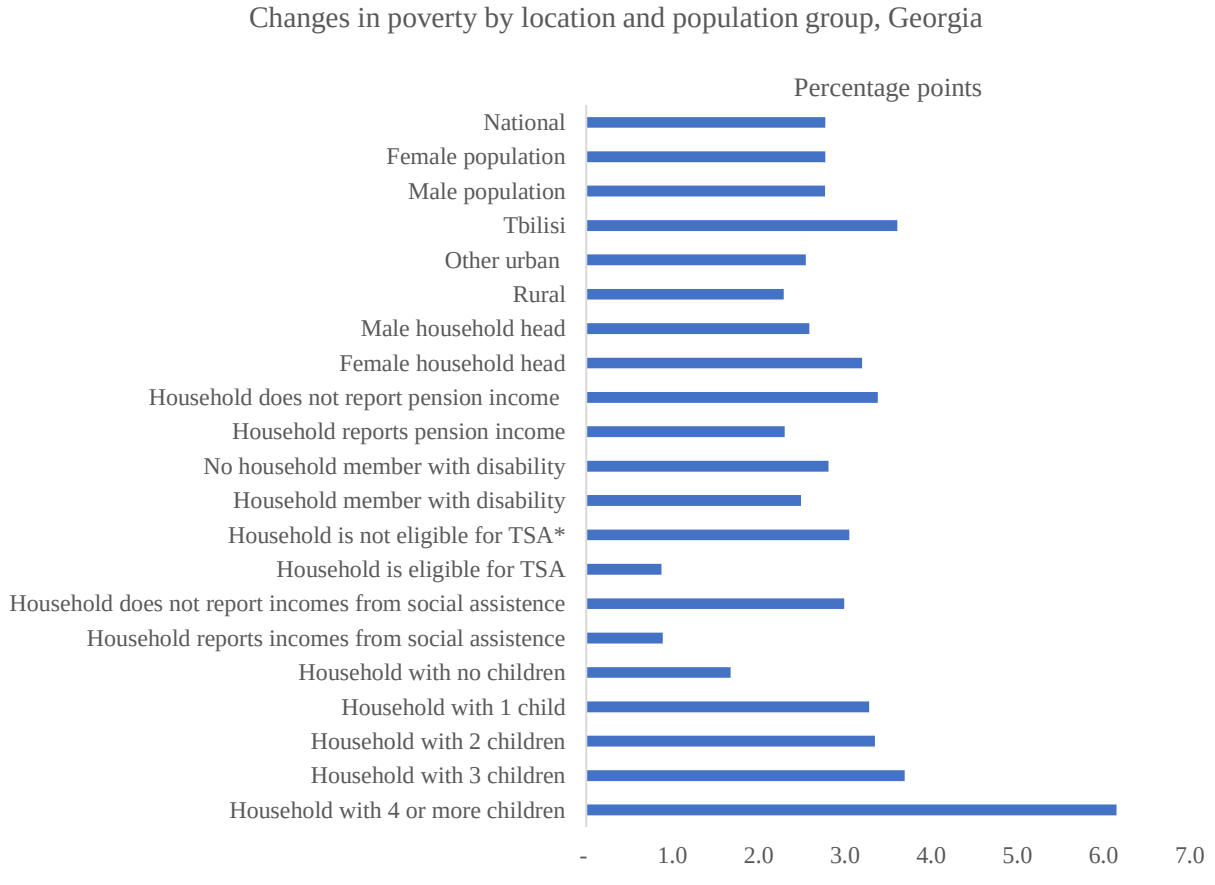
Figure A.8.a. Impact by Location





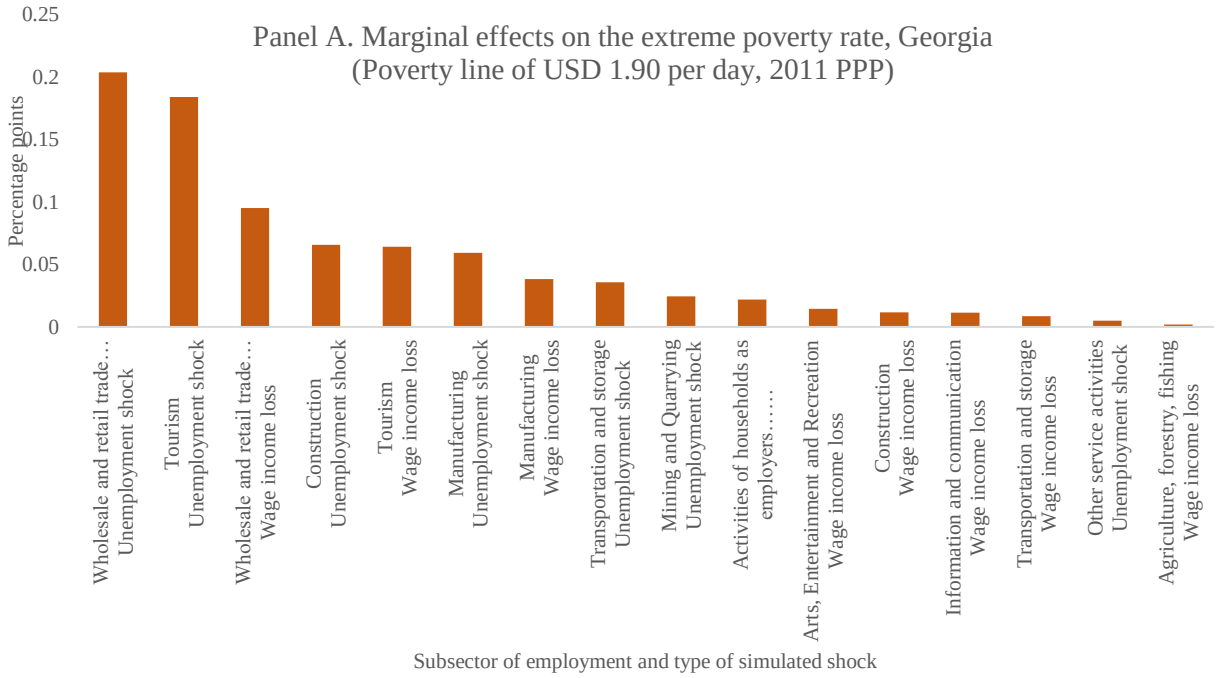
Source: Microsimulations based on the HIES (2018). *Notes:* The counterfactual scenario for 2020 is forecasted based on business-as-usual macroeconomic projections by the MTI GP (February 2020). Income is proxied by the household per capita consumption aggregate.

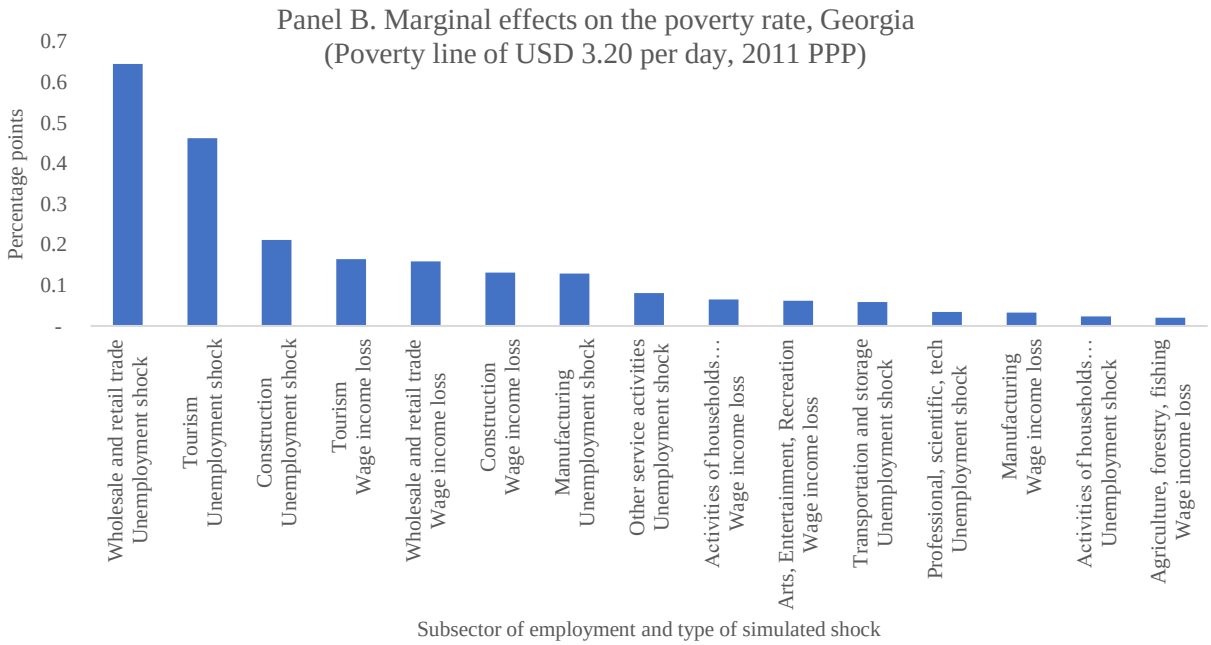
Figure A.8.b. Heterogeneity analysis of poverty changes



Source: Microsimulations based on the HIES (2018) and data on potential household eligibility for TSA shared by the SPJ team. *Notes:* Changes with respect to a counterfactual scenario for 2020, calculated based on business-as-usual macroeconomic projections by the MTI GP (February 2020). Poverty rates based on the international poverty line of USD 3.20 (2011 PPP).

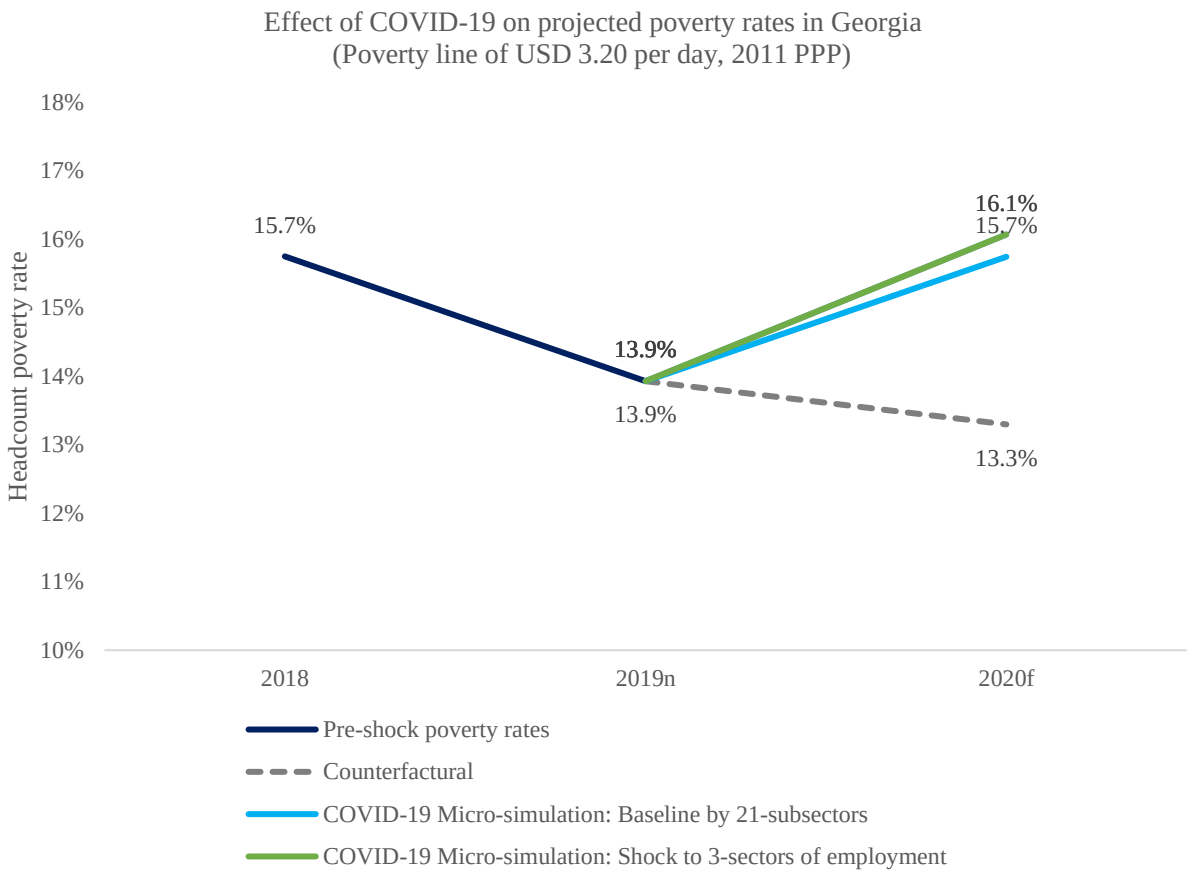
Figure A.8.c. Main marginal effects on poverty by subsector of employment and income shock





Source: Microsimulations based on the HIES (2018) and assumptions of subsector-level shocks presented in Appendix A.5.
Notes: Changes with respect to a counterfactual scenario for 2020, calculated based on business-as-usual macroeconomic projections by the MTI GP (February 2020). Poverty rates based on the international poverty line of USD 3.20 (2011 PPP). All subsectors of employment are based on the NACE Rev.2 classification. Tourism is defined by the authors to include accommodation and food services, selected transportation services, activities of travel agencies, and selected arts, entertainment and recreational activities. Only the subsectors and shocks with largest marginal impact on the poverty rate are shown.

Figure A.8.d. Comparison of microsimulations at the sector (3) and subsector (21) level.



Source: Microsimulations based on the HIES (2018) and assumptions of subsector-level shocks presented in Appendix A.5.
Notes: n: Nowcasted. f: Forecasted.