SOCIOECONOMIC IMPACT OF THE COVID-19 PANDEMIC AND OF THE RESPONSE POLICY IN MOLDOVA: AN INTERGENERATIONAL PERSPECTIVE BASED ON THE COMPUTABLE GENERAL EQUILIBRIUM MODEL

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ABSTRACT

The author employs a Computable General Equilibrium (CGE) model calibrated on a Social Accounting Matrix for the Moldovan economy and enhanced with demographic details to answer three questions: 1) what has been the short-term socioeconomic impact of COVID-19, including the distributional ones from the gender and age perspective? 2) how likely were the 2020 policy measures to provide an adequate immediate response to the crisis? and 3) would there exist an alternative, more optimal policy? According to the CGE-based simulation results, cumulative effect of the COVID-19 economic shocks represents around 11% of the Moldovan GDP. All economic sectors are predicted to decline, with transport, HORECA and services to population sectors suffering the heaviest contractions. Transport sector employs predominantly mid-aged men, while the latter two typically employ women. Age- and sex-structure of employment by sectors explain why men aged 25-34 and women aged 15-24 suffer the largest reduction of their wage income (around 10%). Reflecting the income contraction of the breadwinning age categories and reduction in intra-household transfers, children' consumption declines accordingly. The older generations relying on public pensions are relatively better sheltered against the COVID-19 socioeconomic effects, as pensions remain rather stable. The analysis suggests that the package of measures adopted by Moldovan government has had minor impact, with VAT reduction to HORECA sector having smaller compensatory effect compared to direct payments to infected doctors and labor-related subsidies. A combination of fiscal and structural measures would have provided a socially fairer and economically more efficient response to the crisis.

***Cuvinte-cheie**: Model de Echilibru General Aplicat, matrice de contabilitate socială, politică macroeconomică, răspuns politic, transferuri intergeneraționale, conturi naționale de transfer.*

Autorul folosește un Model de Echilibru General Aplicat (MEGA) calibrat pe o Matrice de Contabilitate Socială pentru economia moldovenească și augmentată cu detalii demografice pentru a răspunde la trei întrebări: 1) care a fost impactul COVID-19 din perspectiva impactului economic și distribuțional pe vârste și genuri? 2) cât de adecvat a fost răspunsul de politici din 2020? și 3) ar fi existat oare o politică mai bună? Modelul sugerează că efectul cumulat al șocurilor provocate de COVID-19 reprezintă aproximativ 11% din PIB și anticipează că toate sectoarele suferă scăderi, cele mai afectate fiind transporturile, HORECA și serviciile prestate populației. Sectorul transporturilor angajează preponderent bărbați de vârstă mijlocie, în timp ce celelalte două - mai mult femei. Structura de vârstă și sex a ocupării pe sectoare explică de ce bărbații de 25-34 de ani și femeile de 15-24 de ani suferă cea mai mare reducere a veniturilor salariale (10%). Reflectând scăderea veniturilor categoriilor economic active și reducerea transferurilor intra-gospodărie,

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consumul de care beneficiază copii scade, în consecință. Generațiile mai în vârstă, care se bazează pe pensiile publice, sunt relativ mai bine protejate împotriva efectelor socioeconomice ale COVID-19, deoarece pensii rămân stabile. Analiza sugerează că măsurile adoptate de Guvern au avut un impact minor, reducerea TVA pentru sectorul HORECA având un efect compensator mai mic în comparație cu plățile directe către medicii infectați și subvenționarea ocupării. O combinație de măsuri fiscale și structurale ar fi oferit un răspuns mai echitabil social și economic mai eficient din punct de vedere economic la criză.

***Key words**: General Computable Equilibrium model, Social Accounting Matrix, macroeconomic policy, policy response, inter-generational transfers, National Transfer Accounts.*

Автор использует прикладную модель общего равновесия (ПМОР), калиброванную на основе матрицы социального учета для экономики Молдовы и дополненную демографическими данными, чтобы ответить на три вопроса: 1) каково было краткосрочное социально-экономическое воздействие COVID-19 с точки зрения пола и возраста? 2) насколько вероятно, что меры политики 2020 года обеспечат адекватный ответ на кризис? и 3) существует ли лучшая альтернативная политика? Модель предсказывает, что совокупный эффект экономических потрясений, вызванных COVID-19, составляет около 11% ВВП и что спад будет во всех секторах, наиболее затронутыми из которых будут транспорт, HORECA (гостиницы, рестораны и кафе) и сектор услуг предоставляемые населению. В транспортном секторе в основном заняты мужчины среднего возраста, а в двух других - главным образом женщин. Возрастная и половая структура занятости по секторам объясняет, почему мужчины в возрасте 25-34 лет и женщины в возрасте 15-24 лет страдают от наибольшего снижения заработной платы (10%). Отражая снижение доходов экономически активных категорий и сокращение трансфертов внутри домохозяйств, потребление детей соответственно снижается. Старшие поколения, которые зависят от государственных пенсий, относительно лучше защищены от социально-экономических последствий COVID-19, поскольку пенсии остаются стабильными. Анализ показывает, что меры, принятые Правительством, оказали незначительное влияние, а снижение НДС для сектора HORECA имело меньший компенсирующий эффект по сравнению с прямыми выплатами инфицированным врачам и субсидированием занятости. Сочетание фискальных и структурных мер обеспечило бы более справедливый в социальном и экономическом отношении более эффективный ответ на кризис.

***Ключевые слова**: Прикладная модель общего равновесия, Матрица социального учета, макроэкономическая политика, ответные меры политики, межпоколенческие трансферты, национальные трансферные счета.*

INTRODUCTION

The COVID-19 pandemic engendered a systemic impact on the Moldovan economy. Domestic administrative restrictions and external shocks undermined the economic activities and boiled the economic system down. Due do the multifaceted and often opposing changes shocks involved, a net assessment of COVID-19 should account for general equilibrium effects. Computable General Equilibrium (CGE) models are particularly useful for undertaking such system-wide analyses. They consistently account for all changes in prices and quantities that shocks trigger in all markets. COVID-19 may have also involved significant distributional effects, as the crisis did not equally hit all economic sectors and, implicitly, all generations. It is thus of practical policy importance to understand which economic sectors and social groups may have been hit particularly hard by the crisis and to assess if the immediate policy measures offered a meaningful response to the crisis. If not, what combination of policy tools would have suited this purpose better? To address these questions, we employ a CGE model calibrated on a Moldovan Social Accounting Matrix augmented with demographic details.

LITERATURE REVIEW

CGE models have been widely used to assess the direct impact of the COVID-19 pandemic and related restrictions. In UK, a CGE model was linked to a population-wide epidemiological and demographic model to assess the macroeconomic impact of COVID-19 and to study the impact of responses such as home quarantine, school closures, social distancing, and business closures (Keogh-Brown et al., 2020). It shows that the pandemics may impose unprecedented economic costs on the UK economy (7-10% of GDP). Whilst public actions are necessary to minimize the associated mortality, without alternative measures to reduce the scale and duration of school and business closures, the governmental economic support may be insufficient to compensate for longer term suppression of the pandemic which could generate an even greater health impact through major recession.

For the South-African economy, (Erero & Mangalani, 2020) combine a CGE model with time series models (Holt-Winter and SARIMA) to study the impact of COVID-19. Their results indicate significant impacts on the macroeconomic variables, employment, sector production and households' wellbeing. As suggested by their CGE model, South-African GDP, exports and private consumption would drop by about 7.10%, 13.19% and 7.10% against the baseline scenario.

In examining the impact of the pandemics on the US economy, (Walmsley, Rose, & Wei, 2021) consider three alternative scenarios of COVID-19 evolution: moderate and declining; moderate and increasing; and extensive and increasing. They find that net losses for the US economy will range from USD 3.2 trillion to USD 4.8 trillion in a 2-year period. The employment decline is estimated to range from 14.7% to 23.8%.

CGE models are excellent tools when it comes analysis of the whole-of-economy impact. However, they may be slightly agnostic in grasping distributional impacts. In order to overcome this limitation, CGE results are often used to conduct micro-simulations based on survey data, such as (Herault, 2005). This requires a structural compatibility of the CGE macro-model and the micro-simulation model.

In the case when long-term inter-generational effects are the main object of study, many economists prefer to use Overlapping Generation (OLG) models. For instance, (Gagnon, Johannsen, & Lopez-Salido, 2020) use an OLG model to explore the implications of mortality during COVID-19 pandemics for the US productive capacity. Their model suggests that the COVID-19 associated mortality will have small effects on output and factor prices for the reason that it is small in proportion to the population and skewed toward retired individuals. However, when combined with the broader economic impact, the COVID-19 effects on the productive capacity are economically significant and persisting for decades.

METHODOLOGY

Our analysis of the general equilibrium impact of COVID-19 in age- and gender-perspective stems from the National Transfer Accounts for Moldova (NTA)[1]. The most important result from the NTA Moldova is a constricted and short lifecycle surplus of Moldovans (Figure 1). With consumption age profiles almost identical for men and women, the striking differences in the lifecycles of men and women in Moldova being explained by the labor income differences (Gagauz, 2021). In turn, the labor income differential comes from significant gender gaps in employment rate (as shown in

[1] The first-ever NTA for Moldova were built in 2016 by the Moldovan think-tank EXPERT-GRUP with the UNFPA Moldova support. In 2020 the NTA was updated for the years 2018-2019 and improved.

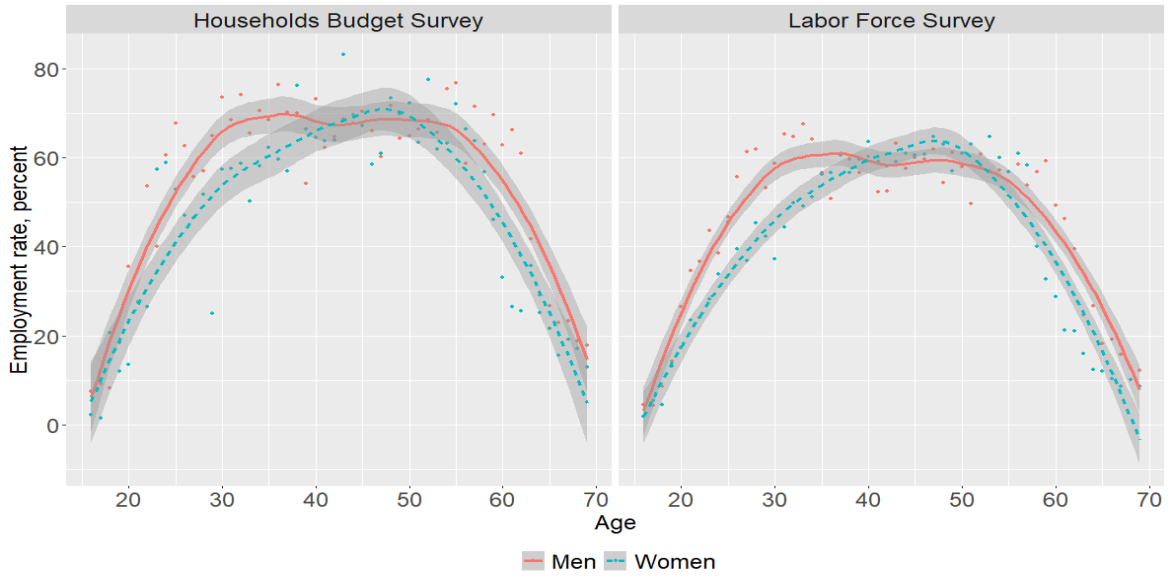

Figure 2) and in average wage (Figure 3). These gaps have been measured using two alternative sources (Households Budget Survey and Labor Force Survey), with broadly concurring results.

Figure 1. Annual consumption and labor income by ages and sexes in Moldova, 2019, thousand MDL/capita

Source: calculated by author as part of the NTA Moldova 2019 exercise.

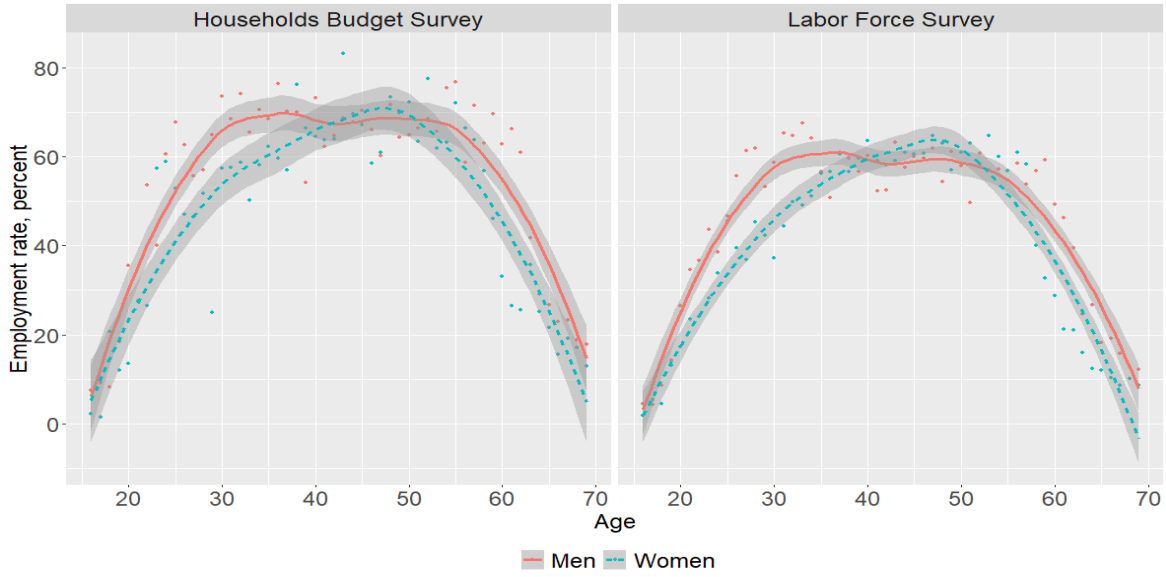

Figure 2. Raw (dots) and smoothed (lines) employment rate in the year 2019 by ages, sexes and sources of data, % of the group population
Source: calculated by author as part of the NTA Moldova 2019 exercise.

Figure 3. Raw (dots) and smoothed (lines) average annual wage in the year 2019 by ages, sexes and sources of data, MDL/capita
Source: calculated by author as part of the NTA Moldova 2019 exercise.

Large gender gaps in employment and wages persist across sectors. Transport, construction and ICT activities are dominated by men, while education, HORECA[1], health and financial sectors feature women as main employees. The ICT is quite young and men-dominated whereas the agricultural sector relies on relatively older employees of both sexes (Figure 4). Public administration, trade, industry and services to business feature more even distributions of employees. Wages of men are significantly higher than wages of women for all ages in agriculture, constructions, ICT, trade and

[1] Hotels, restaurants and cafeteria.

transport (Figure 5). Women wages are typically higher in the education and financial sectors. Among all sectors, industry and public administration are the most egalitarian in terms of the gender pay gap.

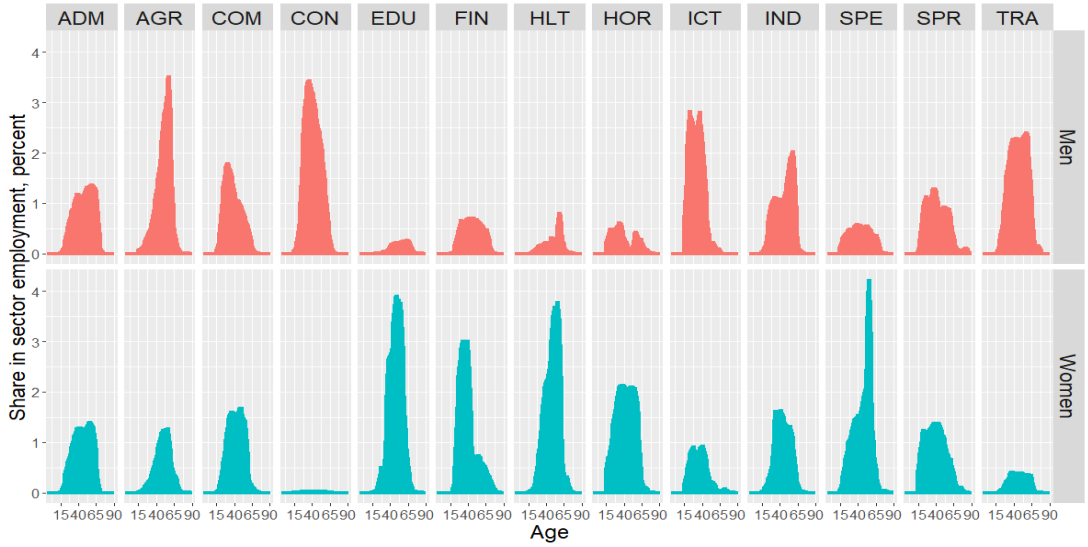

Figure 4. Estimated shares in the total persons employed in 2019, by age, sex and economic activities*, % of total persons employed**

*Note: * - ADM – public administration, AGR – agriculture, COM – trade, CON – constructions, EDU – education, FIN – financial sector, HLT – health protection, HOR – hotels, restaurants and cafeteria, ICT – ICT sector, IND – industry, SPE – services provided to persons, SPR – services provided to businesses, TRA – transport. ** - for each economic activity, shares by sex and age sum up to 100%.*

Source: calculated by author based on the Households Budget Survey 2019.

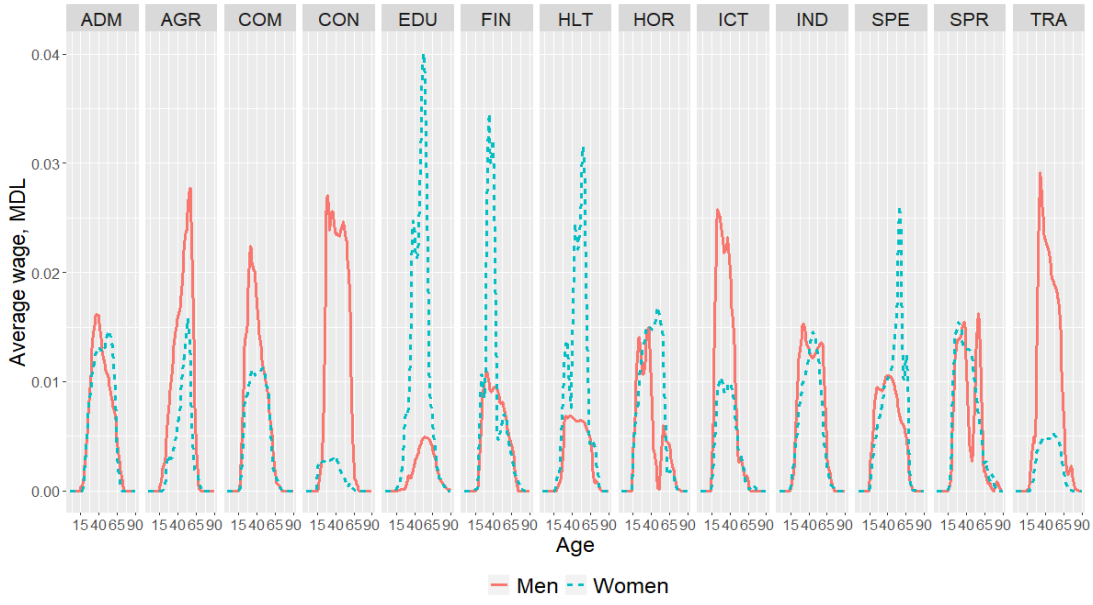

Figure 5. Average net annual wage in 2019 by age, sex and economic activity*, MDL

*Note: * - see note in Figure 4.*

Source: calculated by author based on the Households Budget Survey 2019.

The different age and sex profiles of employment and pay by economic sectors is the key reason why the hypothesis of COVID-19 having differentiated age and sex impact is worthwhile being assessed within a CGE-based economic analysis.

In line with tradition, to get the age and gender-disaggregated distributional effects of COVID-19, either the CGE results need to be used for micro-simulations or the CGE should be of an OLG model. However, both options involve conceptual and computational complexities, therefore we preferred a simpler solution. Our approach has been to integrate microeconomic and demographic data in the CGE macroeconomic framework. Instead of using one "representative household" for the entire economy in CGE model (as is most often the case in the economic literature), we replaced it with a more refined structure of households. We used the NTA results and introduced in the Moldovan CGE model 91 female and 91 male "households" representing the Moldovan population from age 0 to 90 years. These are still "representative" households, but they represent distinct age and sex cohorts, rather than one amalgamated household.

We have also disaggregated the labor factor, by introducing 76 age subcategories for male labor and 76 age categories for female labor (from 15 to 90 years in both cases) for each of the 13 economic sectors included in the model.

In addition, we have the interhousehold private transfers introduced in the CGE/SAM (United Nations, 2013). To do this, we have computed a 182x182 submatrix reflecting transfers from every age category to every age category disaggregated by sexes.

We have employed the IFPRI standard CGE model, which is fully documented in (Lofgren, Lee Harris, & Robinson, 2002). This is a static CGE and results should be interpreted as giving the long-run magnitude of impact of the initial shock against the baseline. While omitting the details related to transitional path to the new equilibrium and not incorporating firms' responses, the advantage of this approach is a better understanding of the socioeconomic exposure and vulnerability to crisis. In the context of the static CGE model we used, the only optimization decision that households take is related to the inter-temporal optimization of the consumption, i.e., allocating their income for goods and services to maximize their utility. Any age cohort, including children, are assumed able to realize and maximize the utility. This approach is not less realistic than the textbook assumption that any aggregate category of households, in general, is able to optimize anything deliberately, be it intra- or inter-temporally.

The model has been calibrated to the Moldovan economic data based on a 307 rows x 307 columns Social Accounting Matrix (SAM) for 2018. The core of the SAM is an input-output (IO) table for the year 2014, the latest for which official data are available. We have mathematically augmented and adjusted the 2014 IO table to fit the 2018 key macroeconomic data using a cross-entropy minimization method (Sherman, Moataz, & Andrea, 2001).

The CGE model used for this research includes 13 economic activities presented in the note under the Figure 4. This selection represents the trade-off between the need to model the sector-level impact of the COVID-19 restrictions and the limitations imposed by data and by the computational complexity.

Scenarios

Shock- and policy-related scenarios simulated based on the CGE model are presented below.

COVID-19 economic shocks

Domestic administrative restrictions (DOM)

On 17 of March 2020, Moldova adopted administrative measures restricting the level of economic activities in a number of economic sectors for 60 days. On May 15 some of the measures have been extended until June 30 and some until mid-September. As economic consequence, the efficiency of using the available production factors by various activities declined proportionally to the length and depth of restrictions. We use the efficiency parameter α_a^{va} of the CES production function in the CGE model to simulate the restrictions. In each of the 13 economic activities, the efficiency parameter has been "shocked" by rates corresponding to changes in efficiency. The general

loss in efficiency is assumed 16.7% (= 60 days of inactivity / 365 days). The more-disaggregated sectors have been affected at different rates and duration, resulting in different rates of loss for the 13 modelled activities. In addition, some sectors (such as agriculture) have not been direct subject to administrative restrictions (Table 1).

Decline of domestic exports (EXPO)

The COVID-related decline in external economic activity resulted in lower demand for Moldovan exports. The level of exports is endogenous in the CGE model, so we do not model the reduction of exports *per se*, but instead use the same efficiency parameter. Reduction in foreign demand can be viewed as occurring due to external 'administrative' restrictions. We use the data on exports for 2020 to calibrate the losses in efficiency by economic activities due to contraction in external demand. This method accounts for the fact that different economic activities depend differently on foreign markets. The losses in efficiency are presented in corresponding column of Table 1.

Table 1

Activities' losses in efficiency associated to scenarios DOM, EXPO and ALL, %

Activity	DOM	EXPO	ALL
AGR	0.0	1.1	1.1
IND	0.0	4.6	4.6
CON	5.0	0.1	5.1
COM	7.4	0.0	7.4
TRA	10.0	10.1	19.5
HOR	16.7	0.9	17.4
ITC	-5.0	1.2	-3.8
FIN	5.0	0.0	5.0
SPR	5.0	0.9	5.0
SPE	16.7	2.0	18.4
ADM	5.0	0.2	5.1
EDU	19.5	0.0	19.5
HLT	2.0	0.0	2.0

Source: author's estimates.

Decline of processed reexports (REXP)

Some activities in Moldova (such as production of electric equipment) function in a dual regime, by producing goods and by providing processing services of raw materials provided by foreigners. In their case, the COVID impact also translated through reduction of foreign orders for processing works. As data suggest, their losses represent around 3 months of the normal activity. We model the impact through activity-level parameter $\theta_{a,c}$ - the yield of the output of the product *c* per unit of activity *a*. The product *c* in this case refers to the service of processing raw material provided by foreign owners.

Changes in terms of trade (TOT)

COVID-induced realignment of prices on the global markets improved the Moldovan terms of trade. According to official data, in 2020 the price of the Moldovan agricultural exports gained around 10%, while industrial goods – around 3%. In case of imports, agricultural goods lost around 1%, while industrial goods – around 3%. These developments compensated the negative shocks to some extent.

Reduction in remittances (REMIT)

According to the Balance of Payments, the remittances declined 3%. For lack of other details, we apply a uniform adjustment rate to the income from remittances in all modelled households. The differentiated response is thus expected to come from different shares of remittances in their income.

All economic shocks (acronym ALL)

This scenario includes all domestic and foreign shocks as defined above. In this scenario the efficiency losses from restrictive measures domestically interact with losses from external slump in demand. For simplicity, we assumed that losses interact in a multiplicative manner. The values of the combined losses are presented in the last column in Table 1.

Policy responses

We simulated the impact of four key policy responses that Moldovan government adopted in 2020 and of one alternative policy package:

- **VAT**: Reduction of the statutory VAT rate by 5% points for the HORECA companies.
- **MED**: One-time personal indemnity for the medical personnel infected by COVID-19. This response is likely to have differentiated impact by both age and sex, considering the structure of employment by age and sexes in the health protection sector (Figure 6).
- **SUBS**: Subsidies to mandatory fringe benefits of the personnel sent in technical unemployment in the economic activities that have been subject to restrictive administrative measures.
- **POL**: This policy scenario includes each of the three policy responses above + ALL.
- **POL1**: This scenario models an alternative policy, which encompasses the MED and the SUBS responses above, and a 1 percent point VAT reduction applied uniformly to all economic sectors (not only to HORECA). In addition, this scenario simulates structural reforms and firms-level responses associated with a 5% reduction in trade and transport margin + ALL.

Macroeconomic and factor market closure rules

The following additional hypotheses have been adopted:

1. There is unemployment in the Moldova economy, and wages adjust to equilibrate the labor supply with demand. This is plausible especially as many Moldovan migrants returned home.
2. The exchange rate is freely floating. This hypothesis is pertinent considering the inflation targeting strategy of the National Bank of Moldova.
3. Budgetary deficit is flexible, adjusting to the level of governmental revenues and expenditures. This is a plausible hypothesis considering the exceptional circumstances affecting the economy.
4. Investments are driven by savings which are computed as fixed share of the disposable income, based on marginal propensity to save (SAM-based calculation).

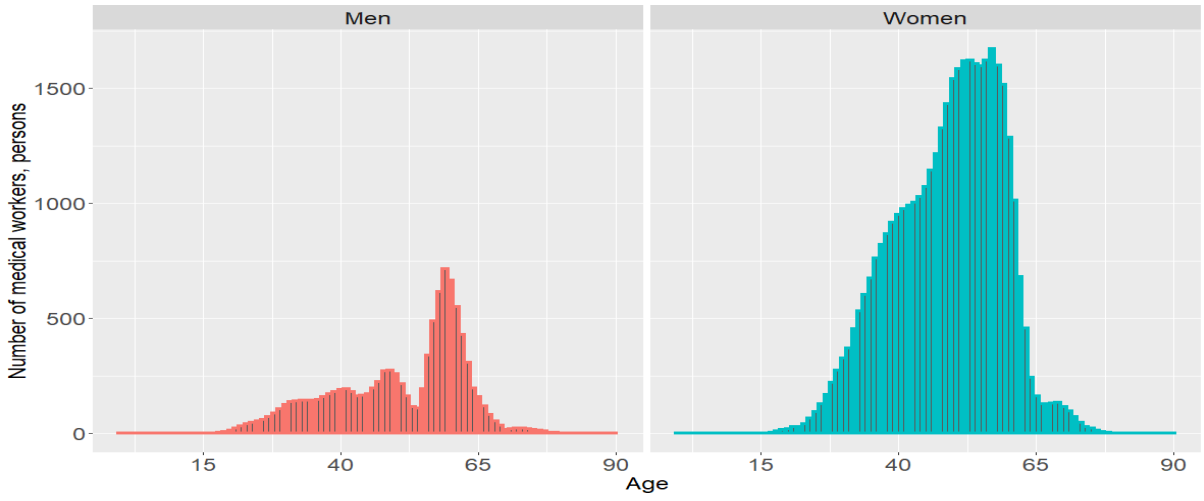

Figure 6. Distribution of medical workers by ages and sexes, persons

Source: calculated by author based on Households Budget Survey 2019.

Simulation results

Macroeconomic and sector level impact. As shown in Table 2, COVID-19 is likely to have inflicted large losses to Moldovan economy. In the ALL scenario, the GDP declines 11% against the baseline scenario. Administrative restrictions (DOM) cost the GDP around 7.5%, while the external shocks on the domestic exports (EXPO) – around 4%. Losses caused by reduction in processed reexports (REXP) represent around 1%, while expected reduction in remittances (REMIT) – 0.1%. Compensatory development in the Moldova's terms of trade is significant (+1.1% to GDP), however, not enough to compensate losses. Except the terms of trade scenario (TOT), the private consumption and fixed capital investment decline in all scenarios, with domestic administrative restrictions causing the heaviest hit to the capital investment. Under the REMIT scenario, the exports grow, while imports recede, due to depreciation of the Moldovan currency following smaller inflows of hard currency from Moldovan migrants (Table 3).

The transport sector is the most affected by COVID-19, even though the administrative restrictions it faced have not been the most severe. The transport sector output declines by 23% (Table 4), reflecting the net effect of both reduced domestic and foreign supplies of goods. The level of activity in the HORECA sector declines by 23%, while the sector of services rendered to population – by 14%. The output declines at significant rates even in sectors which have been not directly subjects of administrative restrictions: agricultural output declines by 8%, while industrial output and the volume of construction works – by 13%. This is the combined result of the reduction in external demand and of domestic intermediate demand from sectors directly affected by administrative restrictions.

The impact of the policy response is remarkably shallow. The VAT response has negligible impact, which is of no surprise considering the dramatic fall in demand of HORECA services. The impacts of the indemnities paid by the government to health workers affected by COVID-19 and of the subsidies to companies sending the staff in technical unemployment are more visible, however, the resources allocated to them are very small. Combined, the three policy measures have a very modest compensatory effect: the GDP under the POL scenario deviates from the ALL scenario by only 0.1% points.

The compensatory impact of the alternative policy scenario, which combines the indemnities, the subsidies, a more modest but more egalitarian reduction in the VAT rate and structural policy is by far more significant in macroeconomic terms. The POL1 scenario costs the budget even less than POL scenario and it has a positive impact on the overall economic situation

Table 2

Impact on real GDP and main components, % deviations from the baseline

	Economic shocks						Policy responses				
	DOM	EXPO	REXP	TOT	REMIT	ALL	VAT	MED	SUBS	POL	POL1
Absorption	-6.0	-3.3	-1.1	1.6	-0.4	-8.8	-8.8	-8.3	-8.4	-8.3	-6.0
Private consumption	-4.5	-3.4	-1.1	1.7	-0.9	-7.9	-7.9	-6.8	-7.0	-6.7	-4.3
Fixed capital investment	-11.8	-4.4	-1.4	2.1	0.6	-14.7	-14.7	-15.3	-15.3	-15.3	-12.3
Exports	-10.2	-6.8	-2.3	0.4	0.3	-17.7	-17.7	-18.1	-17.9	-18.0	-15.0
Imports	-5.1	-3.4	-1.2	2.1	-0.6	-7.8	-7.8	-7.0	-7.1	-6.9	-5.4
GDP	-7.5	-4.0	-0.9	1.1	-0.1	-11.0	-11.0	-10.9	-10.9	-10.9	-9.1

Source: CGE model results.

Table 3

Impact on key macroeconomic indicators, % deviations from the baseline

	Economic shocks						Policy responses				
	DOM	EXPO	REXP	TOT	REMIT	ALL	VAT	MED	SUBS	POL	POL1
REXR	-2.6	1.5	0.8	-1.4	0.3	-1.6	-1.6	-2.1	-1.9	-2.1	-1.2
Investment / GDP ratio	-3.3	-1	-0.3	0.6	0.4	-3.7	-3.7	-4.2	-4.2	-4.2	-3.4
Private savings / GDP ratio	-0.8	-0.4	-0.1	0.2	0.0	-1.0	-1.0	-1.0	-1.0	-1.0	-0.6
Trade deficit	1.7	1.5	0.6	-0.2	-0.3	3.1	3.1	3.5	3.4	3.5	2.5
Budget deficit	-3	-1.2	-0.3	0.4	0.3	-3.8	-3.8	-4.2	-4.2	-4.2	-3.7

Source: CGE model results.

Table 4

Impact on the level of production of the key economic activities, % deviations from the baseline

	Economic shocks						Policy responses				
	DOM	EXPO	REXP	TOT	REMIT	ALL	VAT	MED	SUBS	POL	POL1
AGR	-5.2	-3.4	-0.5	1.0	-0.2	-8.0	-8.0	-7.8	-7.8	-7.8	-5.1
IND	-7.2	-5.1	-1.3	-0.2	0.0	-13.2	-13.2	-13.2	-13.2	-13.2	-9.2
CON	-11.0	-4.1	-1.3	2.0	0.4	-13.7	-13.7	-14.2	-14.2	-14.2	-11.4
COM	-6.8	-4.3	-1.1	0.8	-0.2	-11.1	-11.1	-10.8	-10.9	-10.8	-11.8
TRA	-14.5	-12.2	-0.1	2.0	0.1	-23.3	-23.3	-23.3	-23.2	-23.2	-21.9
HOR	-21.6	-3.2	-0.4	2.7	-0.2	-22.9	-22.7	-22.5	-22.5	-22.3	-20.3
ICT	-0.8	-3.1	-0.6	1.4	-0.4	-3.4	-3.4	-2.9	-2.9	-2.8	-0.8
FIN	-6.4	-3.0	-0.9	1.3	-0.5	-9.2	-9.2	-8.5	-8.6	-8.5	-6.9
SPR	-7.1	-3.4	-0.8	1.5	-0.3	-9.9	-9.8	-9.5	-9.5	-9.4	-8.1
ADM	-2.8	-1.4	-0.4	0.7	-0.3	-4.1	-4.1	-3.8	-3.8	-3.7	-3.1
EDU	-3.9	-0.7	-0.2	0.5	-0.1	-4.3	-4.3	-4.2	-4.2	-4.2	-3.7
HLT	-2.0	-0.9	-0.3	0.6	-0.2	-2.8	-2.8	-2.5	-2.6	-2.5	-1.8
SPE	-13.0	-2.8	-0.4	1.7	-0.3	-14.4	-14.4	-14.2	-14.2	-14.1	-12.6

Source: CGE model results.

Distributional impact. Due to reduction in economic output, the COVID-19 results in reduction of income and consumption expenditures of the Moldovan households. As shown in the Table 5, the men of working age are hit harder by the COVID-19 socioeconomic fallout than women in the same category. The male population aged 25-34 years are likely to experience the strongest decline in their total income – around 11%. In case of women population, the younger cohorts suffer bigger losses in income. Total income includes not only labor income, but also social payments, transfers from other households, remittances, income from agricultural and non-agricultural entrepreneurship and so on. The labor income is the main source of income for the working age generations, the pensions – for pensioners, while public and private transfers (i.e., transfers from "parents' households") are for households with children.

The sex-differentiated impact on the labor income can be explained two factors. First, for all ages, the men face higher exposure to potential labor market shocks due to higher enrollment rates. As seen in Table 6, the labor income of men, especially those in their mid-ages, suffer contractions of around 10-11%, whereas the decline of the labor income of women in the same categories is a bit smaller. Secondly, the sectors which experienced the hardest consequences of COVID-19 – including transport and constructions – are dominated by middle-aged men. Nonetheless, it should be mentioned that many women working in the HORECA and services to population sectors also have

suffered heavy losses in their labor income. The aggregate losses per every age category came mostly from reduction of labor demand and release of personnel.

It is worthwhile mentioning that the income gender gap is not present in case of children. The population of girls and boys aged 0-14 are set to experience more or less equal reductions in their income (around 9%). The missing gap is explained by the fact that their income is completely determined by private interhousehold transfers. At the sending end, private transfers feature more or less balanced mixes of adult female and male households with resulting transfers not having any significant gender pattern.

Compared to younger generations, the older generations in the category of 65+ are likely to experience the smallest reduction in their incomes – around 5%. Their expenditures rely more on public pensions as main source of income and, to a lower extent, on private transfers from younger cohorts. COVID-19 is not expected to have significant implications on public pensions and other social transfers. This is why, in the case of pensioners, as in case of children, the COVID-19 socioeconomic impact does not have any significant gender pattern.

The evolution of the consumption expenditures reflects the total income pattern. With a linear dependency between the level of total income and level of consumption expenditures, the consumption adjusted proportionately to the losses in total income of every age group.

Again, we find little evidence that the policy package designed by the government in the year 2020 has had any meaningful impact compensating the welfare losses. At the same time, the proposed alternative policy, provides a more tangible relief to all ages and to both men and women. The reduction in transaction costs throughout the economy significantly increases the level of activity, enhances the demand for labor factor across all sectors (except trade) and results in increase labor income for all ages, men and women alike.

Table 5

Impact on total income by population groups and scenarios, % deviations from the baseline

Group	Economic shocks						Policy responses				
	DOM	EXPO	REXP	TOT	REMIT	ALL	VAT	MED	SUBS	POL	POL1
male 0-14	-5.1	-4.0	-1.3	2.1	-0.7	-8.7	-8.7	-7.7	-7.9	-7.6	-4.7
male 15-24	-5.4	-4.1	-1.4	2.2	-0.6	-9.0	-9.0	-8.1	-8.3	-8.1	-5.0
male 25-34	-6.8	-5.0	-1.7	2.5	-0.4	-10.9	-10.9	-10.3	-10.4	-10.2	-6.8
male 35-44	-6.6	-4.8	-1.6	2.4	-0.5	-10.5	-10.5	-9.8	-9.9	-9.8	-6.4
male 45-54	-6.5	-4.7	-1.6	2.4	-0.4	-10.4	-10.4	-9.7	-9.8	-9.6	-6.2
male 55-64	-5.1	-3.6	-1.2	1.9	-0.9	-8.5	-8.5	-7.4	-7.6	-7.4	-4.4
male 65+	-1.9	-1.5	-0.5	1.0	-2.0	-4.9	-4.9	-2.8	-2.8	-2.8	-1.5
female 0-14	-5.1	-4.0	-1.3	2.1	-0.7	-8.7	-8.7	-7.7	-7.9	-7.7	-4.8
female 15-24	-4.7	-3.7	-1.2	2.0	-0.8	-8.1	-8.1	-7.0	-7.2	-7.0	-4.2
female 25-34	-4.0	-3.2	-1.1	1.8	-1.1	-7.3	-7.3	-6.0	-6.1	-6.0	-3.5
female 35-44	-3.3	-3.4	-1.1	1.8	-0.8	-6.6	-6.6	-5.3	-5.7	-5.2	-2.6
female 45-54	-2.8	-3.2	-1.1	1.7	-0.7	-5.9	-5.9	-4.6	-5.1	-4.6	-1.9
female 55-64	-2.1	-2.3	-0.8	1.3	-1.3	-5.1	-5.1	-3.5	-3.7	-3.4	-1.5
female 65+	-1.9	-1.6	-0.5	1.0	-2.0	-4.9	-4.9	-2.8	-2.9	-2.8	-1.5

Source: CGE model results.

Table 6.

Impact on income from labor by population groups and scenarios, % deviations from the baseline

Group	Economic shocks						Policy responses				
	DOM	EXPO	REXP	TOT	REMIT	ALL	VAT	MED	SUBS	POL	POL1
male 15-24	-5.5	-4.5	-1.5	2.2	-0.2	-9.1	-9.1	-8.8	-8.9	-8.7	-5.8
male 25-34	-6.7	-5.4	-1.8	2.4	0.0	-11.1	-11.1	-11.0	-11.0	-10.9	-7.7
male 35-44	-6.6	-5.3	-1.7	2.4	0.0	-10.8	-10.8	-10.7	-10.7	-10.6	-7.3
male 45-54	-7.1	-5.2	-1.8	2.4	0.0	-11.1	-11.1	-11.1	-11.1	-11.0	-7.3
male 55-64	-6.7	-4.7	-1.6	2.2	0.0	-10.3	-10.3	-10.2	-10.2	-10.1	-6.3
male 65+	-2.0	-3.4	-1.1	1.9	-0.2	-4.5	-4.5	-4.2	-4.2	-4.1	-1.4
female 15-24	-5.4	-4.7	-1.7	2.3	-0.1	-9.2	-9.2	-9.0	-9.1	-8.9	-5.6
female 25-34	-3.1	-4.1	-1.4	1.7	-0.3	-6.8	-6.8	-6.4	-6.5	-6.3	-3.8
female 35-44	-1.7	-3.7	-1.4	1.6	-0.3	-5.2	-5.2	-4.8	-4.8	-4.7	-2.1
female 45-54	-0.5	-3.1	-1.2	1.3	-0.2	-3.3	-3.3	-3.0	-3.1	-3.0	-0.5
female 55-64	-0.6	-3.0	-1.1	1.5	-0.2	-3.2	-3.2	-2.9	-2.9	-2.8	-0.3
female 65+	-0.2	-3.1	-1.0	1.7	-0.3	-2.8	-2.7	-2.3	-2.4	-2.2	-0.1

Source: CGE model results.

CONCLUSIONS

As suggested by CGE model, the cumulative effect of the COVID-19 economic shocks represents around 10-11% of the GDP. This is largely in line with the real GDP reduction that Moldova went through in 2020: -7.5 percent, against the 4.5% growth expected before COVID-19 (and drought) hit the Moldovan economy. Sectors dominated by SMEs suffer the heaviest economic blows. The transport sector is expected to suffer the most significant reduction in output level (more than 23% against the baseline). It employs men of all age categories, with mid-age adults dominating. HORECA sector also suffered comparable losses, while the services provided to population is set to decline 14%. Opposite to transport sector, these two typically employ women. The public economy sectors (including public administration, health and education) are less vulnerable to COVID-19. Again, these results are fully consistent with the effective figures seen in the 2020 statistics.

Reduction in output results in reduction of labor demand and, in some cases, in downward adjustments of the wages. This is the key cause of significant welfare losses due to COVID-19. When all domestic and external shocks combine, men of working age suffer the heaviest loss (around 11%) in their labor income. Among other age categories of women, those in the 15-24 age category suffer the largest reduction of wage income (around 10%), which is explained by the relatively high share of employment of women in this age group in HORECA and population services sectors. Real data show no significant reduction in the level of employment in general, however, there is a dramatic two-fold increase in the underemployment rate, which is consistent with our findings.

Reflecting the income contraction of the breadwinning age categories, the consumption expenditures for other ages adjust accordingly. Children' consumption declines because of reduced level of private transfers from adult generations, for whom wages and remittances are the main sources of income and financing transfers to younger generations. The older generations relying on public pensions are relatively better sheltered against the COVID-19 socioeconomic effects. Indeed, according to budgetary reports for 2020, pensions and other social payments did not suffer reductions.

The policy response has had relatively low compensatory effect. The VAT reduction for the HORECA sector does not have a sizable economic effect, even on the sector itself. Indeed, the reduction in fiscal burden is of little relevance when the demand itself has been absent. The indemnities paid for medical workers and subsidies on the mandatory social and medical contributions related to staff in technical unemployment have more prominent impacts than the

reduced VAT for HORECA, but, still, are negligible considering the small amounts of public resources behind them.

We simulated a package of alternative policy measures. This package includes the indemnities for medical workers and job subsidies but treat VAT reduction in a different manner – a more modest 1 percent reduction in the statutory VAT rate is applied but all activities are allowed to benefit of it. In addition, this package mimics a structural policy resulting in a 5% reduction of trade margin and transport margin for all sectors and all types of supplies (domestic, import, export). This reduction can be achieved, for instance, by improving the competitive and anti-trust policies across all sectors and does not require significant public expenses.

The trade sector has been found to be the only sector losing from this alternative policy package, while others benefit greatly. This alternative package halves the loss in GDP, yet it is not sufficient to fully compensate the loss, considering the depth, magnitude and time extent of COVID-19.

This result is quite significant and suggests that distributional impact of COVID-19 would be economically more efficient and socially more just to be addressed by a more balanced mix of fiscal and structural policies. The results of this research suggest that the Government should consider how its policy targets the SMEs in the most exposed sectors (transport, services, HORECA). By their very nature, many of these measures adopted so far have been designed to address the relatively large companies, rather than the smallest ones, which suffer particularly severe forms of liquidity crisis.

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