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julio de 2021

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Abstract

The health-care crisis due to the spread of Covid-19 has caused profound disruption on the Mexican economy and society. Our purpose in this paper is to contribute to the knowledge on the economic impacts the pandemic has had in Mexico and to evaluate social policy options to mitigate its effects. We do so based on a multisectoral-multiplier model and the most recent Social Accounting Matrix of Mexico, by which we estimate the direct and indirect impacts of Covid-19 as well the likely effects of two alternative policies aimed at mitigating these impacts: an unconditional cash transfer scheme for households living in poverty and the establishment of an insurance program for workers who have lost their jobs during the spread of the disease. We find that the former policy is superior to the latter since it alleviates more value added and income losses, as well as poverty incidence and inequality.

Keywords: Pandemic, Economywide impacts, Social policies, income distribution, poverty.

JEL codes: C63, H12, P36, P43

1.- Introduction

Mexico has been one of the countries hardest hit by the pandemic caused by SARS CoV-2 or Covid-19: by Oct. 28, 2020, 1,054,019 people had contracted the virus and defuncions have reached 105,396 (Mexican Government, 2020). The purpose of this paper is to present the main results of our research project aimed at estimating the direct and indirect socioeconomic effects of Covid-19 in Mexico. For this we use a multisectoral-multiplier model using the most recent Social Accounting Matrix for Mexico, constructed for 2018 by the National Institute of Statistics, Geography and Informatics (INEGI, Spanish acronym, SAM-MEX from now on).¹

Specifically, our purpose is to estimate the multisectoral effects of the pandemic on the Mexican economy and society, as well as the likely impact of two alternative social policies to mitigate the consequences of the disease: a cash transfer program to poor households before the health-care crisis and added to these households the poor population during the first four months of the health-care crisis and an unemployment program for those workers who lost their jobs during this period.

The paper is organized as follows. In section 2 we present a summary of the literature with the purpose of making projections about the effects of Covid-19 on the economy of developing countries, including Mexico and those studies based on applied multiplier models. Section 3 summarizes the methodological and empirical approach we followed, i.e. the multiplier model and the data set we used (the SAM-MEX) and the procedures followed to estimate the impacts of Covid-19 on income distribution and poverty. Section 4 is dedicated to discussing the simulations on the pandemic shock, policy options we made and the main results on the likely socioeconomic impacts of these shocks, including our estimations of the impacts of two alternative social policies aimed at mitigating some of the consequences of the spread of Covid-19. Section 5 of the paper contains our conclusions.

2.-Literature review

There is now a myriad of estimations on the socioeconomic effects of COVID-19 all over the world. These estimations have been revised continuously due to the uncertainties caused

¹ We obtained the SAM-MEX from INEGI, Department of Experimental Statistics.

by the ups and downs in the spread of the pandemic and accordingly, the return of governments' lockdown measures.²

After deep disparities on the forecasts about the effects of COVID-19 on the Gross Domestic Product (GDP) of Mexico made by Mexican and international institutions, these discrepancies are lower in more recent estimations (the latter are presented in Table 1). The projections for 2020 GDP reduction are now similar for most of the institutions listed in the table (they fluctuate around 9 and 10%); excepting the Finance Ministry estimation (7%). These institutions coincide on the forecast recuperation for Mexico's GDP in 2021: between 2.7 and 3%. However, under Bank of Mexico's (BANXICO, Spanish acronym) pessimistic U scenario, this institution projects for 2021 an extension of the recession (-0.5) or a lower GDP growth (1.3%), revealing the prevailing uncertainties about the near future of the Mexican economy.

Table 1. Projected Changes in Mexico Gross Domestic Production (GDP)

Institution	GDP forecast
Organisation for Economic Co-operation and Development (OECD, 2020)	-10.2% in 2020 3% in 2021
International Monetary Fund (IMF, 2020b)	-9% in 2020 3.5% in 2021
Bank of Mexico (BANXICO, 2020a)	Three scenarios according to the shape of economic recovery: "V": -4.6% to -8.8% in 2020 4.0% to 5.6% in 2021 "Deep V": -8.8% to -11.3% in 2020 4.1% to 2.8% in 2021 "Deep U": -8.3% to -12.8% in 2020 -0.5% to 1.3% in 2021.
Mexican Finance Ministry (SHCP, Spanish acronym, 2020b)	-7% to -10% in 2020 3.6% to 5.6% in 2021
World Bank (WB, 2020b)	-10% in 2020 3.7% in 2021

Own elaboration based on websites of the listed institution (see References).

² See for example, Cuesta and Hannan (2020), and WB (2020a).

There are also estimations on the effects of COVID-19 based on multiplier models applied to Mexico.³ There are four published results coming from these models: Central Bank of Mexico (BANXICO, 2020b), Chapa (2020), Chapa and Ayala (2020), and Diaz-Gonzalez (2020).

All four of these studies use Mexico's input-output table for 2013; and estimate the impacts of COVID-19 depending on the duration of lockdown measures. The differences amongst these studies are the degree of sectoral disaggregation, the shock scenarios, and the modeled type of recovery process of the Mexican economy. BANXICO (a study made before the one referred to in Table 1) adds supply shocks to the traditional final-demand shocks applied in the other three publications and performs its shock simulations based on state-level data. Chapa's estimations are for Mexico as a whole and for the State of Nuevo Leon. Chapa and Ayala's study is for the four regions of Mexico and Diaz's for Mexico. What is similar in the four studies are the characteristics of the coverage of the initial lockdown measures since all of them use the nonessential economic activities selected by the government ordering their immediate shut down under the decree published in the Official Journal of the Federation (DOF, Spanish acronym), containing the orders for dealing with the emergency health-care situation (DOF:31/03/20, 2020).

However, due to the differences above stated among the reviewed studies, the estimated effects of the pandemic sharply differ. For example, under an optimistic scenario (lockdown measures are lifted in the second or third quarter of 2020) the estimations of the impacts of COVID-19 for changes in the GDP during 2020 go from 5.6% (BANXICO, 2020b) to 14.8% (Diaz, 2020). If lockdown measures extend beyond the second or third quarter (pessimistic scenario), estimated changes in GDP for 2020 range from 8.5% (Chapa and Ayala, 2020) to 17.4% (Diaz, 2020).

The acute differences in the projections on the recovery of the Mexican economy are explained not only by the differences in the empirical strategy followed in the studies referred, based on multiplier analyses, but also because they ignore the effects of policy

³ SAM-multiplier models have also been applied to African and Asian countries, see International Food Policy Research Institute (IFPRI, 2020, 2020).

changes decided on by the Mexican government to mitigate the economic and social effects of the pandemic.

To avoid these contrasts and considering the prevailing uncertainties about the duration and intensity of the spread of COVID-19 and the corresponding lockdown measures, in our study we followed a different simulation strategy.⁴ We calculate the SAM based multiplier effects of the pandemic on the Mexican economy and society using the most recent official data on its evolution during the pandemic (the data is for July 2020 provided by INEGI). Using the results, we simulate public policies in place aimed at reducing the perverse effects of the pandemic, as well as alternative policies. Another difference between our study and previous ones is that in addition to the estimation of the impacts of COVID-19 on the Mexican economy, we calculate the impacts of income distribution caused by the pandemic and its likely effects on poverty incidence.

3.- Empirical approach

Typically, a multiplier model assumes that: economic activities use input in fixed proportions to output; technology and preferences are linear; prices are fixed and so, adjustments to shocks work through changes in quantities. These assumptions are appropriate for estimating the likely, multisectoral effects of shocks that are felt over a short period of time such as those arising from COVID-19.

A SAM-multiplier model contains two groups of accounts: endogenous and exogenous and the equilibrium equation of the model can be expressed as:

$$y_n = (I_n - A_n)^{-1}X = M_a X \quad (1)$$

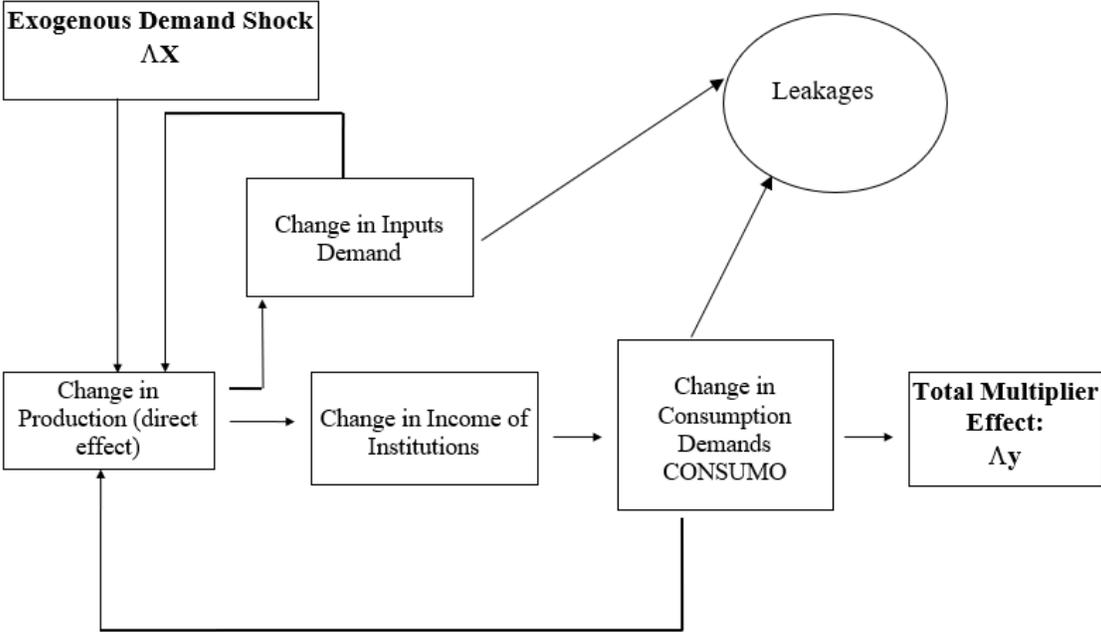
Where y_n is endogenous income, I_n is an identity matrix $n \times n$, A_n is a square matrix of average propensities of consumption and X is the matrix of exogenous injections to endogenous accounts. M_a is the SAM-multiplier matrix relating endogenous income y_n with exogenous variables X . M_a captures the direct and indirect effects of exogenous shocks, and so the equation determines the equilibrium of products and incomes consistent with any level of

⁴ We also use a more recent data set, for 2018, provided by the Social Accounting Matrix (SAM) for Mexico and not its input-output table.

exogenous entries (Round, 2003). Figure 1 illustrates the direct and indirect effects of an exogenous shock captured by a multiplier model.

Figure 1. MULTIPLIER MODEL SCHEME

$$\Delta y = MX + \Delta X$$



Source: own elaboration.

A scheme of a SAM is presented in Table 2, an accounting frame that captures the interconnections of an economy, including its social components for a period, generally a year.

Table 2. Basic SAM Accounts

<i>INCOME</i>	<i>EXPENDITURES</i>					TOTAL
	1	2	3	4	5	
	Activities	Factors	Institutions	Capital Investment	Rest of the World	
1. Activities	Input-output Table		Consumption	Investment	Exports	Total Sales
Primary						
Manufacturing						
Services						
2. Factors	Value Added				Transfers	Value Added (GNP at factor prices)
Labor						
Capital						
3. Institutions						
a. Private households by Income Decile, etc.		Value Added Transfers	Transfers		Transfers (remittances)	Total income of institutions
b. Public (Government)	Direct Taxes	Taxes	Direct Taxes			
4. Capital			Savings		Capital Transfers	Total Savings
5. Rest of the World	Imports					Imports
TOTAL	Total Payments	Total Payments to Factors	Total Expenditures	Total Investments	Income from abroad	Totals: Income/Expenditure

Source: Own elaboration.

SAM-MEX contains: 171 goods and services; 71 productive activities; 18 types of labor (divided by gender, age and schooling) and physical capital; 22 institutional accounts (10 correspond to households divided by their income decile), Central Government, two non-financial societies (one private and one public) and 10 financial institutions that include inventory change and gross fixed capital formation (GFKF); 18 capital accounts; 27 financial accounts; and the rest of the world .

Following standard procedures, we selected as exogenous accounts institutions' final demand, government, capital formation and rest of the world. Since one of our purposes is to estimate the likely impacts of alternative policies to mitigate the effects of COVID-19 on the Mexican economy and society, we distinguished government's expenditures as follows. Government's final demand for goods and services; government's payments to institutions, properties and transfers to institutions (the latter includes monetary transfers from social programs to households); changes in government inventory and investments in GFKI; and public debt.

The SAM-multiplier analysis allows for estimating the impacts of COVID-19 on households' income distribution and poverty. With respect to the former we used two measures. The first is called Gini Concentration Index or GCI (Medina, 2001 and de Miguel and Pérez-Mayo, 2006), defined as follows:

$$GCI = 1 - \sum_{i=1}^{n-1} (X_{i+1} + X_i)(Y_{i+1} + Y_i) \quad (2)$$

where X_i is the cumulative proportion of population in group i and Y_i the cumulative income of group i . $GCI = 0$ indicates no income inequality and $GCI = 1$ means total inequality.

The second method to measure inequality is the Theil index (TI):

$$TI = \sum_{i=1}^n y_i \log \left(\frac{y_i}{n_i} \right) \quad (3)$$

where y_i and n_i correspond, respectively, to relative income distribution and the population of group i . Like GCI, TI close to zero indicates low levels of inequality.

With respect to poverty, we follow Pyatt and Round (2006) for measuring the changes on poverty incidence caused by COVID-19, applying the following equation:

$$\frac{dS_i}{S_i} = (1 + |\epsilon_i|) \frac{dn_i}{n_i} - \frac{|\epsilon_i|}{y_i} z'_i M_{m1} dx \quad (4)$$

Where: i is the number of poor people in the household group I ; S is the number of poor people in our study, identified as those with a current income below the welfare line according to the National Council for the Evaluation of Social Development Policy (CONEVAL, Spanish acronym) guidelines; n_i is the number of people included in an income group; ϵ_i is the elasticity of the incidence of poverty for households in group i with respect

to changes in their average per capita income; y_i is the total income of the i th household group; z'_i is a vector with the i th element equal to 1 and all other elements equal to 0; and M_{ml} is the sub-matrix $g \times s$ of accounting multipliers from activities throughout household groups (where g is the number of household groups and s is the number of activities in the SAM); and x is the vector of inflows from the exogenous sectors in the original SAM.⁵

4.- Simulations and results

In this section we present the simulations we performed, and the main results obtained, first in relation to the effects of COVID-19 on the economy and Mexican society and then with respect to alternative policies to mitigate the pandemic.

4.1. The impacts of COVID-19

We estimated the multiplier effects of COVID-19 on the Mexican economy and society by simulating the following exogenous shocks: on final demand for goods and services; on remittances received by households from abroad; inventory changes and on GFKF. For this, we used data from the Economic Information Bank (BIE, Spanish acronym) of INEGI (INEGI, 2018a) and from BANXICO (2020c). We used the most recent data published by these institutions, covering the first six months or the first two quarters of 2020.

Specifically, we proceeded as follows. For final demand we included domestic and foreign demand, using monthly data from INEGI on sales from sectoral productive activities at constant 2013 prices.⁶ In particular, for the construction sector we used the income indicator provided by the National Survey of Construction Enterprises (ENEC, Spanish acronym); for manufacturing the corresponding indicator provided by the Monthly National Survey of Manufacturing industries (EMIM, Spanish acronym); for commercial services we used the income index from the Monthly Survey of Commercial Enterprises (EMEC, Spanish acronym); and for non-financial services the same indicator provided by the Monthly Survey of Services (EMS, Spanish acronym).⁷ We did not include changes in the final demand for

⁵ To apply equations 2 to 4 we required additional data provided by INEGI National Households' Income-Expenditure Survey (ENIGH, Spanish acronym) (INEGI, 2018b). Our estimations are available upon request.

⁶ With the exception of the manufacturing sector, the rest of the data series are at constant prices. We deflate the series based on its implicit price index.

⁷ ENEC, EMIM, EMEC and EMS data can be consulted in INEGI (2018b).

primary and financial services since no monthly data for 2020 is available that is compatible with the previous series, and also because these activities were not subject to lockdown measures.

For remittances we used monthly changes provided by the Economic Information System of BANXICO (BANXICO, 2020c). Since this official source does not provide monthly data to distinguish the recipients of these transfers by income decile, we applied the same rate of change to the ten household groups in SAM-MEX.

For Inventory Changes we used the official data from INEGI that covers the first and second quarters of 2020 (INEGI, 2020d).

For GFKF we used monthly data from INEGI (INEGI, 2020c).

We used the information listed above to estimate the monthly rates of change with respect to the same month of the previous year.⁸ We applied them to the corresponding values of SAM-MEX exogenous accounts in order to simulate the likely multiplier effects COVID-19 had from April to July 2020 (i.e. from the beginning of lockdown measures to July 2020, the date of the most recent official data to be published). Table 3 depicts the values of the simulated shocks and the endogenous SAM-MEX accounts directly affected by them.

Table 3. Exogenous simulated shock on endogenous accounts

Endogenous account	Exogenous modification	Exogenous Shock (millions of Mexican pesos)
Goods and Services	Final demand	-1,754,577.06
Households	Remittances	37,998.93
Inventory Changes	Inventory Changes	-112,176.34
Gross Fixed Capital Formation	Net Fixed Capital Formation	-143,588.15

Source: own estimations using INEGI (2020c and 2020d) and BANXICO (2020c) data.

Table 4 shows the monthly effects of pre- and COVID-19 pandemic on value added or VA and its two components. The figures indicate that the pandemic deepened negative rates of growth already present during the first three months of 2020. For example, as compared to

⁸ For the series non-seasonally adjusted, we implement the X11 method to adjust them. We use the "seas()" function in "seasonal" of the R package.

the reduction of total VA by \$35 billion constant pesos during January 2020 with respect to January 2019, in April 2020 the decrease reached \$386 billion and \$425 billion in May. These reductions began to decrease in June and July when lockdown measures and social distancing became more relaxed. Capital is the component of VA that has suffered the largest losses (during the pandemic its contribution to VA reduction was 71.5%).

Table 4. Monthly Impact of Covid-19 on Value Added with respect to previous year (millions of current MXN)*

	Labor	Capital	Total
January	-15,251.72	-19,712.61	-34,964.33
February	-13,415.42	-19,791.05	-33,206.46
March	-31,550.01	-55,577.99	-87,128.00
April	-108,832.04	-276,678.12	-385,510.16
May	-119,792.10	-304,965.02	-424,757.12
June	-80,937.47	-200,770.92	-281,708.39
July	-60,799.37	-149,479.63	-210,278.99
Total Change during the Pandemic	-370,360.98	-931,893.68	-1,302,254.66
Total change during 2020	-430,578.13	-1,026,975.32	-1,457,553.45

* Figures include income from VA as well as transfers from government, remittances, etc.
Source: own estimations

A consequence of the reduction of VA is that household income decreases (Table 5). Figures show that as compared to the first seven months of 2019, all households experienced a reduction in income during the same months of 2020 and those forming part of the higher deciles experienced greater income reductions.

We also found that the COVID-19 shock has reduced income inequality in Mexico. According to the Gini Concentration Index estimations, inequality decreased by 0.25% and according to the Theil index, the reduction is 0.33%, meaning, respectively, that income inequality in Mexico changed from 0.4560 to 0.4553 and from 0.1615 to 0.1612. Thus, COVID-19 income loss has been greater for wealthier households.

Table 5. Covid-19 Impact on Household income by decile*

Decile	Millions of MXN	Changes**
I	-19,931.88	-9.41%
II	-34,080.84	-9.77%
III	-44,190.83	-10.02%
IV	-53,743.98	-10.14%
V	-67,034.85	-10.43%
VI	-80,349.51	-10.44%
VII	-99,468.93	-10.53%
VIII	-122,843.55	-10.49%
IX	-172,920.43	-10.58%
X	-424,487.29	-10.36%

* Figures includes income from VA as well as transfers from government, remittances, etc.

**With respect to the disposable income of each decile.

Source: own estimations

4.2. The impacts of Covid-19 on Poverty

With regards to the likely economywide impacts of the pandemic on poverty incidence by household decile, we estimated the elasticity of poverty of SAM-MEX income decile groups IV to VI. We excluded deciles I to III since all households in these deciles have incomes below the poverty line and, according to our estimations, the income loss caused by Covid-19 has made them poorer (Table 5). In addition, we excluded deciles VI to X because their income was above the poverty line before and also during the pandemic.⁹

Our results indicate that due to Covid-19 the proportion and number of households in deciles IV to VI have undergone an increase in poverty, and so, poverty incidence in Mexico has risen from 49% to 57%, which means that 5.029 million Mexicans were added to the previous population living in conditions of poverty. (Table 6)

⁹ Even with the income reduction due to Covid-19, households' income in deciles VI-X remained above the CONEVAL's (2018) poverty line.

Table 6: Effects of Covid-19 on Poverty

Decile	Shares		Number	
	Poverty Incidence before the shock	Poverty Incidence after shock	Poverty Incidence before the shock	Poverty Incidence change after the shock
I	100.00%	100.00%	12,511,524	0
II	100.00%	100.00%	12,507,713	0
III	100.00%	100.00%	12,513,161	0
IV	76.97%	86.77%	9,629,077	1,225,141
V	78.72%	100.00%	9,845,810	2,661,350
VI	32.36%	41.50%	4,047,627	1,142,438
VII	0.00%	0.00%	0	0
VIII	0.00%	0.00%	0	0
IX	0.00%	0.00%	0	0
X	0.00%	0.00%	0	0
Total	48.81%	57.04%	61,054,912	5,028,929

Source: Own estimations based on SAM-MEX, ENIGH (INEGI, 2018b) data and CONEVAL (2018, n/d).

4.3. Government measures during the Covid-19 pandemic

Before presenting the simulations that we implemented on policy options to mitigate the effects of the pandemic, it seems pertinent to summarize the actions taken by the federal administration to deal with Covid-19.

On April 19, 2020 President Lopez Obrador announced an austerity program for public expenditures, including reallocation of “non-priority” expenditure to “priority” items and voluntary wage reductions for high-ranking government officials. Based on the most recent report of the IMF (2020a), Mexico's key policy responses up to the beginning of October can be summarized as follows. In addition to an increased health budget for the Ministry of Health, the federal government has applied other fiscal measures. It has channeled monetary support to households and firms; frontloading two bimesters’ payments to the pensions for the elderly and disabled persons; accelerating procurement processes and VAT refunds; credits to firms and workers in both formal and informal sectors. The Ministry of Economy is granting loans with optional repayment to one million small enterprises in order to keep employees on their payrolls, to self-employed and to domestic workers, and another one

million in loans to family businesses previously registered in the Welfare Census. The government is also providing subsidized unemployment insurance for 3 months to workers who hold a mortgage with the Housing Institute, and additional fiscal resources are allocated to social spending related to infrastructure, security, education, and other areas. Other measures to mitigate the effects of Covid-19 include housing credits for government workers with low-interest rates, personal loans at a low rate and a deferral program of monthly payments by the National Fund Institute for Workers' Consumption (Instituto del Fondo Nacional de la Vivienda para los Trabajadores, INFONAVIT, Spanish acronym).

In the monetary sphere, several measures have been applied intended to boost credit, strengthen liquidity and guarantee the proper functioning of financial markets: providing liquidity support by development banks. The Central Bank has cut interest rates and reduced the mandatory regulatory deposit: it is also opening financing facilities for commercial and development banks aimed at channeling resources to micro, small and medium-sized enterprises and individuals affected by lockdown measures. In order to ensure the complete functioning of financial markets, the central bank has drawn on the US\$60 billion swap line with the Fed.

4.3.1 Social Policy Options

We center our simulations on the likely economywide effects of two social alternative policies to mitigate the effects of Covid-19. We did not estimate the impact of other policies because, notwithstanding the fact that a multiplier model is a useful tool to simulate a broad spectrum of public policies and their economic implications, there are limitations regarding the SAM-MEX structure and the information needed for making other simulations.

However, the simulations we made are consistent with the current government focus on social policies and with the corresponding policy suggestions from the Economic Commission for Latin America (ECLAC). ECLAC suggests direct transfers to vulnerable individuals; unemployment insurance; economic support for low-income and informal workers as well as those employed by a small or medium-sized enterprise. ECLAC also suggests soft loans to enterprises for the payment of salary; the deferral of mortgage and rent payments, the condonation of payment for essential services for low income households, among others (ECLAC UN., 2020a).

Based on the budgetary constraints faced by current federal government, we simulated two policy choices whose fiscal cost would be the same: non-conditional direct cash transfers and unemployment insurance. The budgetary amount we used to simulate each of these policies was (102,368.45 million 2018 pesos, MXN\$ from now on).¹⁰ These two public policies have been thoroughly debated in Mexico, before and during the pandemic (Esquivel, 2020 and Rivero Cob, 2020).

i) Cash transfers

The results presented in Table 5 indicate that the economywide impacts of Covid-19 on the income of Mexican households have been considerable and differentiated. The pandemic has negatively affected all economic strata, and augmented poverty incidence by 8.23 percentage points (Table 6).

The Inter-American Development Bank (IDB, 2020) and ECLAC (ECLAC UN., 2020b) have advised that in order to respond to the economic crisis governments need to insure a minimum income level for all households. For Mexico, this could have been achieved through *Prospera*, a conditional cash transfer program.¹¹ However, for 2019 the federal budget assigned to this component of Mexico social policies decreased by 57% and was nil for 2020 (SHCP, 2018, 2019 and 2020a). Furthermore, the programs that substituted *Prospera* are not designed to cover households that due to the pandemic now live in conditions of poverty; i.e. these alternative programs are not designed to fight poverty in conjunction with the measures followed to mitigate the effects of the pandemic. It is then convenient to analyze the efficiency of a public policy consisting of direct income transfers to Mexican households in the setting of the health crisis.

For this purpose, we simulated a single transfer of MXN\$1,549.08 to the population in poverty during the confinement measures. The monetary amount applied in the simulations is equivalent to the extreme income poverty line published last September, measured in 2018

¹⁰ In 2018 pesos, this amount is equivalent to 60% of the federal budget for social programs during 2020. Estimations based on the Finance Ministry (SHCP) figures: SHCP 2018, 2019 and 2020a.

¹¹ IDB (2020) modeled a scenario for Mexico, the Bahamas, Chile and Panama, in which every household would be eligible to receive a transfer equal to the amount of the international poverty line of US \$ 3.1 per capita per day during three months. IDB found that the cost of the transfer is less than 0.5% of the annual GDP in these countries, considering that a family has an average of 5 members.

MXN. This poverty line corresponds to the monetary value of a food basket of minimum consumption in the urban area¹², as calculated by CONEVAL.¹³ Table 7 shows the estimated costs by decile of the simulated policy. In total it would amount to MXN\$ 102,368.45 million.

Table 7. Proposed cash transfers (million MXN\$)*

Decile	Total transfers*
I	19,381.40
II	19,375.50
III	19,382.36
IV	16,814.37
V	19,374.64
VI	8,040.17
VII	0.00
VIII	0.00
IX	0.00
X	0.00
Total	102,368.45

* The amounts of transfers are distributed according to figures of Table 6.

Sources. Own estimations

Table 8 presents the results of the simulation. It indicates that the simulated cash transfers considerably reduce the negative effects of the pandemic on the beneficiaries of the program (deciles I-VI), to the extent that the impact is reversed from negative to positive for the first decile. Furthermore, it shows that due to the multiplier effect of the support to poor households, the initial reduction in income of non-beneficiaries (deciles VII-X) caused by pandemic decreases by approximately one percentage point.

¹² We used only the urban extreme poverty line since SAM-MEX does not distinguish the type of area in which the households are located.

¹³ Public entity officially designated to measure poverty in Mexico.

Table 8. Impact of Cash Transfer Impacts on Household income by decile

Decile	Income Changes	
	Covid-19 impacts	Covid-19 and public policy impacts
I	-9.41%	0.95%
II	-9.77%	-3.00%
III	-10.02%	-4.42%
IV	-10.14%	-5.78%
V	-10.43%	-6.25%
VI	-10.44%	-8.23%
VII	-10.53%	-9.37%
VIII	-10.49%	-9.33%
IX	-10.58%	-9.45%
X	-10.36%	-9.18%

Source: Own estimations

In addition to the above, it may be observed that public cash transfer policy to poor households mitigates the drop in the value added of the Mexican economy, going from -11.30 (during the pandemic) to -10.06%, and as expected, the policy stimulates the reduction of inequality in a range of 2-3.6% (Table 9).

Table 9. impact of Cash Transfers on inequality

Indicator	Inequality		Percentual change
	Covid-19 scenario	Covid-19 and public policy scenario	
GINI	0.4553	0.446	-2.04%
THEIL	0.1612	0.1554	-3.60%

Source: Own estimations

ii) Unemployment Insurance

One consequence of the shutdown due to Covid-19 pandemic has been the loss of jobs. According to INEGI (2020a, 2020b) unemployment rates during April, May and June 2020 have been 4.7, 4.2 and 5.5%, respectively. The figures are above the 2.8% registered in March 2020, before the lockdown and social distancing began to be implemented by Mexico's federal government. A policy measure suggested to face the employment problematic has been the adoption of unemployment insurance (Esquivel 2020, ECLAC 2020b). However, this strategy has only been adopted by two States governments: Yucatán and Mexico City, while its enforcement nationwide has not been approved in spite of the fact that 15 law initiatives were presented in the Parliamentary Gazette between August 2012 and April 2020 (Rivero Cob, 2020).

In this subsection we analyze how the negative economic effects due to the health-care crisis would be modified if unemployment insurance were implemented. The simulation of this policy is based on the unemployment program currently applied in Mexico City (Ministry of Labour STFYE, Spanish acronym, 2020, and Rivero Cob, 2020). Specifically, the simulation consists of assigning MXN\$ 5,870.13 per month during the pandemic period modeled (four months from April to July) to unemployed individuals older than 18 years of age. Although the policy in Mexico City consists only of two monthly transfers of MXN\$ 1,390.2 to unemployed individuals, in the simulation we adjusted the amount so that its total cost coincided with the policy of income transfers of previous simulation (i.e. MXN\$102,368.45 million). It should be noted that as well as allowing us to compare the effects of these two policy options, the adjusted per capita amount is above the urban poverty line (MXN \$3,001.67), but below the minimum average monthly amount workers declare they require to stay at home during the pandemic: MXN\$ 6,170.83 (Hernández-Solano and Triano-Enríquez 2020).

A necessary input for the simulation is the number of unemployed individuals during the quarantine for each of the income distribution deciles before the start of the health-care crisis. The estimation of this information follows Hernández-Solano et al. (2020) and uses data from a household survey whose purpose is to evaluate the impacts of the pandemic: *Seguimiento de los Efectos del Covid-19 en el Bienestar de los Hogares Mexicanos* (Follow-up of the Effects of Covid-19 on the Welfare of Mexico Households) (ENCOVID-19, Spanish acronym, Teruel-Belismelis, 2020).

We made the estimations in two steps: In the first one we estimated the linear regression model of Hernández-Solano et al. (2020) to predict the income before the pandemic of households included in ENCOVID-19. This was done using socio-economic variables that describe the household's situation before the pandemic and variables that do not change over time. Afterwards, we gathered labor information from ENCOVID-19 to estimate the number of unemployed individuals during the first 15 days of April 2020 broken down into income deciles.

Our results indicate that between 3.27 and 5.62 million people lost their employment or could not find a job during April 2020 (confidence interval of 95%). Table 10 shows the distribution of unemployed individuals by income decile according to the income distribution data registered before the health-care emergency. Table 10 also includes the costs per decile and total costs to implement the simulated employment insurance policy for all unemployed individuals during the month referred to.

Table 10. Unemployed Individuals and Program Income Transfers (millions MXN\$)

Decile	No. of Unemployed	Insurance Transfers
I	728,272	17,100.20
II	699,392	16,422.09
III	466,877	10,962.51
IV	778,440	18,278.18
V	261,800	6,147.20
VI	441,719	10,371.81
VII	234,841	5,514.20
VIII	376,914	8,850.13
IX	226,884	5,327.35
X	144,578	3,394.77
Total	4,359,716	102,368.45

Source: Own estimations

Table 11 presents the results of the simulation related to households' income by decile. It shows that unemployment insurance mitigates the negative effects of the pandemic on income in all economic strata. However, since it is a less progressive policy than cash transfers, its effectiveness in the poorest deciles (I-III) is less than that of the latter.

Table 11. Impact of Unemployment Insurance on Household income by decile

Decile	Changes	
	Covid-19 impact	Covid-19 and public policy impact
I	-9.41%	-0.16%
II	-9.77%	-3.89%
III	-10.02%	-6.37%
IV	-10.14%	-5.54%
V	-10.43%	-8.34%
VI	-10.44%	-7.97%
VII	-10.53%	-8.82%
VIII	-10.49%	-8.61%
IX	-10.58%	-9.16%
X	-10.36%	-9.14%

Source: Own estimations

In addition to this result, Table 12 indicates that income transfer might be preferred in comparison to unemployment insurance since its multiplier effect on improving equality is higher. Finally, our results indicate that unemployment insurance is less effective in reducing the loss in value added of the Mexican economy due to the pandemic: 1.19 vs 1.24 percentage points, respectively.

Table 12. Unemployment Insurance Impacts on inequality

Indicator	Inequality		Percentual change
	Covid-19 scenario	Covid-19 and public policy scenario	
GINI	0.4553	0.4482	-1.56%
THEIL	0.1612	0.1565	-2.92%

Source: Own estimations

5.- Conclusions

The pandemic caused by Covid-19 took world leaders by surprise. After more than six months of this health-care crisis, uncertainties remain about the rate of spread of the disease

during the following months and thus, about the required social distancing and lockdown measures to contain it and its socioeconomic consequences.

In Mexico, since the application of the National Development Program 2019-2024, the new federal government has prioritized social policies, reflected by the increase of its budget granted to the Social Development Ministry (now called Welfare Ministry): at constant 2018 pesos this budget increased by 41% from 2019 with respect to 2018 and by 20% in 2020 as compared with 2019; the latter notwithstanding austerity measures applied to the federal budget of 2020. President Lopez Obrador also modified policies applied by the Social Ministry. In 2019 he created a program to promote agroforestry of small rural households (called *Sembrando Vida*); in 2020 he abolished *Prospera*, Mexico's symbolic conditional cash transfer program aimed at reducing the poverty of poor households; and in 2019 and 2020 increased the budget for pensions to the elderly and disabled. In 2020 *Sembrando Vida* represents 16.3% of the total social budget and the two pension programs account for 81.8% of this budget (SHCP 2019 and 2020, see also Mexican Government, n/d).

These policies are not designed to mitigate the effects of Covid-19 on poor households, which is illustrated by our estimations of the direct and indirect impacts of the pandemic indicating that poverty incidence increased from April to July 2020 due to the decline of final demand, inventories and investment (this notwithstanding the observed increase of remittances Mexican households receive from relatives working abroad). So, to reduce income decline and poverty incidence we propose that social policies different from or in addition to current ones are required. For this, we selected two alternative policies: an unconditional cash transfer program to households in poverty before and due to Covid-19 and unemployment insurance. Based on this, on public budget limitations and on the controversy about where to channel governmental social subsidies, we simulate the likely multiplier effects of these two alternative policies, applying the same budgetary amount to each of them for comparative purposes. Our results indicate that direct monetary cash transfers to households in poverty are superior to an unemployment insurance policy for those who have lost their jobs during the pandemic; because the former alleviates more income loss, inequality, and poverty incidence.

Since these findings are based on the application of a model and data, not flawed by preconceived ideological biases and political interests that have characterized the discussion of policies before and during the pandemic, our study could contribute to the design of efficient and effective government measures to mitigate the socioeconomic effects of the health-care crisis.

Notwithstanding the above, more research is required to fully understand the consequences of the pandemic on the Mexican economy and society as well as to explore the most adequate policies to reduce these and to promote future development in Mexico. In terms of multisectoral approaches based on the Social Accounting Matrix of Mexico, it would be possible to simulate current and alternative policies beyond social policies when required data becomes available. Furthermore, based on this SAM, it is possible to extend our research to cover a longer period and to incorporate relative prices based on a computable general equilibrium model.

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