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Estimating the economic and social impact of conditional cash transfers from the Prospera Program in Mexico

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Abstract

This research analyses the Prospera program's impact on poverty and income distribution through a computable general equilibrium model. It concludes that transfers to households have a positive impact on the Mexican economy but hide the real problem—the low wage share—that, in the long term, prevents poverty from worsening but does not reduce the population in poverty or inequality. In a scenario without transfers, neither the population in poverty nor the Gini Index decreases significantly.

The results obtained lead to an understanding of some of the causes of the high rates of poverty and inequality in Mexico, which in turn have been perpetuated since the economic crisis of 1995. This allows the design of public policies in line with the structural needs of the economy, which combat the problem from the root that generates it, in order to contribute to the reduction of inequality in accordance with the UN Sustainable Development Goal 10.

Keywords: Applied general equilibrium model, income redistribution, Social account matrix, poverty, well-being

JEL: C68, D31, D58, E16, I32

1. Introduction

The last third of the 20th century and part of the 21st century have been characterised by an increase in distributional inequality of wealth and income (see, for example, (Atkinson, 2015) (Piketty, 2014)). This variance of income and poverty distribution has made it necessary to study the social implications of distributive and redistributive processes.

Among these contributions is the analysis, study, and evaluation of social policies implemented by governments to mitigate poverty and inequality. These should prioritise the level of well-being of the population and their acquisition of consumer goods and services. Well-being can be interpreted, as proposed by Sen (1995), as a necessary condition to achieve higher-level goals such as happiness.

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Thus, different countries have implemented programs to fight poverty that have had great successes but, at the same time, have great inconsistencies, as seen in the case of Mexico, where poverty rates have so far not significantly decreased.

Analysing the economic and social impact of the hypothetical elimination of conditional cash transfers (CCTs) from the Prospera program is an important contribution of this research since one of the objectives of these programs is to stimulate demand (Cecchini and Martínez, 2011; Stampini and Tornarolli, 2012). Sadoulet et al. (2001) find that the main evidence of the Oportunidades Program at the rural level is the multiplier effect, that is, its impact on aggregate demand.

Therefore, the objective of this research is to estimate the sectoral economic impact of the CCTs of the latest poverty-fighting initiative in Mexico—Prospera—implemented by the federal government and its impact on the inequality and poverty index for 2014. It seeks to determine whether the Prospera program contributed to poverty reduction and improved income redistribution in compliance with its main objective, in addition to whether it stimulated the country's productivity through demand, thus meeting the program's second goal of democratising productivity in the 2013–2018 period.

To achieve these objectives, the study first conducts an overview of the conditions of poverty and inequality for 2012–2014[2], which provides the basis of the construction of the impact vector and the benchmark between the two scenarios proposed. Second, a social accounting matrix (SAM) for Mexico is used as a database to construct a computable general equilibrium model[3] (CGE) that represents the Mexican economy based on the main macroeconomic variables reflected in the SAM. Finally, we analyse the impact of CCTs on the Mexican sectoral economy and production, as well as their effects on the poverty and inequality indices, through a microsimulation model.

It has been shown that income transfer programmes generate an economic impact, which is observable in the short run, as such transfers increase households' disposable income, which almost immediately modifies the consumption and production decisions of the beneficiary households, producing in an additional way an indirect impact on non-beneficiary households and other macroeconomic variables. This set of outcomes can be accurately measured through a CGE model based on a SAM proposed in this research with its short-term approach (Martínez et al., 2013; Arellano & Chapa, 2017).

We use a CGE[4] in this research because, to meet the proposed objectives, it is necessary to review in a counterfactual manner the path followed by the CCTs (through their

[2] The changes presented between 2012 and 2014 (see Table 1) allow us to give an overview of the poverty situation in Mexico, as CONEVAL does. Our research does not aim to analyse the evolution of poverty in Mexico. Therefore, the description of the poverty situation related to the year 2014 can help to contextualise and understand the size of the problem in question and the comparative statics analysis proposed in this research in line with our main objective. The year 2014 is taken as the year of study because, on the one hand, it coincides with the period in which poverty levels were close to those of 20 years ago. On the other hand, it marks a new stage of the main CCT programme in Mexico, a year in line with the base year of the SAM used.

[3] As demonstrated by the early two-sector models of Harberger (1962) and Shoven and Whalley (1972) and Piggott (1980) for fiscal policy analysis, Deardof and Stern (1986) and Whalley (1985) with their models for evaluating trade policy options, Keyzer and Wim (1994) for agricultural policy analysis, among other research.

[4] Simulations of public policy changes based on CGE models show indirect effects that are not included in other methodological approaches, showing effects that are not expected, but quite interesting for policy-makers (Taylor and Filipski, 2014), highlighting

elimination from the Mexican economy) to households and to thus determine their potential to influence both the country's economic production and growth and income redistribution; that is, to determine their multiplier effect. In other words, we analyse the impact of the CCTs on household welfare and the country's economic activity.

CGEs allow determining a shock's direct and indirect impacts on the economic structure compiled in a SAM, institutional agents and income distribution.

2. Background

Fluctuations in the growth of the Mexican economy have brought with them a landscape of income inequality. Even during periods of growth, poverty reduction has been slow due to the high level of income inequality[5]. After 1982, the Mexican economy entered a period of low growth, accentuating income inequality.

Although poverty decreased once the economy began its liberalisation process in 1950–1984, today, it is again at high levels. Income poverty increased because of the 1995 economic crisis, reaching its highest level in 1996. From that year until 2006, the percentage of those whose income was below the poverty line tended to fall; however, from 2008 to 2014, poverty levels increased to levels close to those of 20 years ago[6] (Cortés, 2002).

Despite the efforts made by the federal government to reduce poverty, these efforts have not shown encouraging results; in contrast, the poverty rates remain at the same level and the income gap is increasingly larger.

According to the National Council for the Evaluation of Social Development Policy CONEVAL (2015), the population with an income below the minimum welfare line in 2012 was 20% and 20.6% in 2014, and their difference was not statistically significant. However, the population with an income below the welfare line increased by 1.6% from 51.6% in 2012 to 53.2% in 2014, which was a statistically significant change (see Table 1).

Both the reduction in household income for 2012–2014 and demographic dynamics were fundamental factors in the increase in poverty in this period (CONEVAL, 2015). According to the National Institute of Statistics and Geography (INEGI), the average quarterly total current income decreased in real terms for 2012–2014 by 3.5%, reflecting a decrease in the purchasing power of the population, except for decile I, which presented an increase of 2.1%[7].

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the relevance of the CGE. It is worth highlighting the importance of analysing social programs as presented by Fiszbein, Kanbur and Yemtsov (2014) and Lu et al. (2013).

5 Note that the last period of sustained growth in Mexico was until 1982, with a rate of approximately 7%.

6 2014 is taken as the year of study since it coincides with the period in which poverty levels were close to 20 years ago. Additionally, due to the nature of the methodology, a comparative statics exercise, a reference or base year is used to make the simulations.

7 The poverty estimations for 2014 by the CONEVAL were calculated based on the databases of the Socioeconomic Conditions Module of the National Household Income and Expense Survey (MCS-ENIGH) conducted by INEGI.

Regarding income distribution, the Gini index for 2012–2014, presents a nonsignificant variation, showing an environment of relative inequity. In 2014, slightly more than half of the population could not afford a basic food basket with their income, and one in five Mexicans could not even afford it (see Table 1).

Table 1. Evolution of national poverty and extreme poverty, 2012–2014.

Evolution of national poverty and extreme poverty, 2012–1014					
	Percentage		**Thousands of people**		**Statistical significance**
	2012	**2014**	**2012**	**2014**	**Level of significance**
Multidimensional poverty	45.5	46.2	53,350	55,342	Not significant
Moderate poverty	35.7	36.6	41,800	43,900	Not significant
Extreme poverty	9.8	9.5	11,529	11,442	Not significant
Welfare					
Population with income below the minimun welfare line	20.0	20.6	23,500	24,600	Not significant
Population with income below the welfare line	51.6	53.2	60,600	63,800	*
Gini index	0.497	0.503			Not significant

Hypothesis tests are two-tailed, with a significance level of 0.05*

Source: Own elaboration based on Coneval (2015)

Therefore, since the end of the 1990s, the federal government has been implementing anti-poverty programs to counteract the effects of the 1994 devaluation, in response to which poverty levels increased drastically. Prospera is the last known anti-poverty program (reformed in 2014 and modified in 2019 by a scholarship program).

Prospera was a social inclusion program to improve the income and well-being of families in poverty and other conditions, such as food, education, and health, as well as labour inclusion, bank credit, productive inclusion, insurance, and savings, to break the intergenerational cycle of poverty[8]. In addition, in response to the framework of the Program to Democratise Productivity 2013–2018, the program was aligned with the second objective of increasing the productivity of workers, companies, and producers in the country[9].

The federal government invested almost 73 billion pesos in 2014 in this program, according to the Federal Expenditure Budget for 2014, being the program with the largest budget allocation in the fight against poverty. Given the relative importance of this

[8] The last five were the differentiating factors addressed by Prospera, which are not included in the Oportunidades Program.

[9] According to Prospera's operating rules for fiscal year 2016. Official Gazette.

program in terms of budget and objectives, at least in theory, analysing it is of particular interest.

CCT programs such as Prospera have a direct impact on the income of beneficiary households, causing changes in the demand for different consumer goods, generating indirect effects on the economy, and affecting total production. In the short term, the aim is to reduce poverty through income transfers. In the long term, it seeks to strengthen human capabilities through access to health and education services or the improvement of social minimums so that different effects are expected in these dimensions (Cecchini and Martinez, 2011).

Thus, measuring poverty through income is conducted under the premise that income levels can determine the potential of an individual to acquire goods and services that help generate capabilities, i.e., the total resources available throughout his or her life, depending on the environment, will determine where he or she develops a certain potential to achieve a set of basic capabilities. The total wealth that an individual manages to generate, together with the capacity to mobilise it, determines his or her poverty situation, according to both personal characteristics and the social environment (De la Torre, 2005).

3. Database and methodology

Any economic decision has consequences for the different agents and sectors due to the interrelation between them. These effects can be identified following multisectoral methodologies. Initially, these models were applied to an input–output matrix (Leontief, 1970; Schultz, 1977; Cella, 1984), but it was not possible to capture some effects on the final demand distribution or the effects of productive factor distribution among the agents of the economy. With the introduction of SAM to input–output analysis, the closure of the circular flow of income was achieved, allowing a complete analysis of the interrelations between economic agents (Pyatt and Round, 1979; Defourney and Thorbecke, 1984; Llop and Manresa, 2004).

A SAM is a database that shows in a matrix format all the production accounts of an economy in a period and represents a snapshot of the inter-sectoral transactions of an economic system, its production operations, and the distribution, use and accumulation of income according to Stone (1962), Pyatt y Round (1985) y Pyatt (1988).

Consequently, the simulation proposed in this research uses a SAM[10] for the Mexican economy, constructed for the year 2012 (SAMMEX-12) from the domestic symmetric input-output matrix, the accounts of goods and services and by institutional sectors published by INEGI, which was used as a database for the calibration of the different parameters and variables of the CGE.

The SAMMEX-12 considers 35 endogenous accounts, including the 19 productive activities, remunerations to productive factors, corporations, capital, private consumption, and 10 households differentiated by income deciles. In addition, it

[10] For a brief methodological explanation of the SAM included in this research, see Annex 1.

considers seven exogenous accounts: the government and its tax disaggregation, the savings-investment account, and the rest of the world.

In addition, the CGE constructed in this section, called CGEMEX, is made up of four differentiated agents that intervene in the Mexican economy—19 productive sectors obtained from the SAMMEX-12, 10 types of households, the government, and the external sector; capital and labour as a productive factor; and an account that represents savings investment.

The CGEMEX is based on the traditional Walrasian equilibrium doctrine but includes enterprises, the public sector, and the external sector, according to Scarf and Shoven (1984), Ballard et al. (1985), and Shoven and Whalley (1992). Perfect competition in the productive sectors, full employment in the productive factors, and clearing of goods markets are assumed[11]. First, the price formation of the economy is defined, followed by a description of the behaviour of economic agents and the equilibrium condition.

3.1 Price model

First, a price model is constructed following Cardenete and Sancho (2002), which describes the price formation of the CGEMEX. The price formation rule distinguishes the formation of output prices (price=unit cost) in each productive sector due to the characteristics of the technology and the competitive behaviour of the enterprises. The production price, p_j, is defined as follows:

$$p_j = \left(1+\tau_j\right)\left(\sum_{i=1}^{19} q_j a_{ij} + \left(1+s_j\right)wl_j + rk_j + \left(1+t_j\right)p_m a_{mj}\right) \quad (1)$$

where a_{ij}, l_j, k_j and a_{mj} are the technical coefficients of the productive sectors, labour factor, capital factor, and foreign sector, respectively; r is the unit remuneration of capital, so rk_j is the payment for using capital in the production of good j; w is the wage rate; s_j is the social security payment made by the employer of sector j; t_j are the taxes on imports of sector j; and τ_j are the net taxes on production. Each of these takes different values for each sector. Finally, p_m represents an aggregate price index of imported products.

The final price q_j is the result of using the indirect value-added tax (VAT) such that:

$$q_j = p_j\left(1+VAT_j\right) \quad (2)$$

Note that the structural parameters (a_{ij}, a_{mj}, l_j, k_j) and tax parameters (s_j, VAT_j, t_j and τ_j) were calibrated from SAMMEX-12.

The technical coefficients of the Mexican productive sectors a_{ij} and import products a_{mj} were calculated as follows:

$$a_{ij} = SAM(i,j)/X_j \quad (3)$$

[11] These assumptions, although they do not represent the Mexican economic reality, are adopted in accordance with the traditional Walrasian equilibrium model, which, knowing its limitations, provides a scenario of possible decision-making results. An extension of this research would be the introduction of assumptions that come a little closer to actual conditions.

where a_{ij} shows the proportion of the production of sector i from sector i.

The productive factors labour l_j and capital k_j were calculated as follows:

$$L_j = SAM(Labor,\ j)/X_j \tag{4}$$

$$K_j = SAM(\text{Capital},\ j)/X_j \tag{5}$$

$$M_j = SAM(\text{RoW},\ j)/X_j \tag{6}$$

where L_j, K_j and M_j are the vectors of direct labour, capital, and external sector coefficients of the j sectors.

The taxes considered were calculated from SAMMEX-12 for each productive sector j based on the following idea:

$$Taxe\ rate_j = Collection_j/Taxable\ income_j \tag{7}$$

In this case, the price of capital services and the rest of the world are considered exogenous in the model. These equations reproduce the SAMMEX-12 data as a microeconomic benchmark equilibrium in which all prices (endogenous and exogenous) are unitary. Since the initial prices are fixed as unitary, it is possible to compare prices by modifying the initial parameters in the simulation scenario.

3.2 Productive sectors

Perfect competition is assumed in all goods markets. Nineteen productive sectors are distinguished according to SAMMEX-12, which develops a single homogeneous good, combining domestic production $DomProd_j$ and imports $Import_j$ through Leontief technology, where $DomProd_j$ for each sector uses the output of other sectors as factors. Value-added VA_j combines primary factors with labour and capital through Leontief technology.

The total production Q_j of each of the goods supplied (j =1, 2..., 19) by each productive sector is given by a function nested in three levels.

The first level of nesting combines domestic production $DomProd_j$ with the equivalent imports of each sector, $Import_j$ which are considered imperfect substitutes for domestic production, following Leontief technology under the assumption of Armington (1969).

Therefore, the production of sector j is given by:

$$Q_j = \min\left(DomProd_j, Import_j\right) \qquad \text{where} \quad j = 1, 2, \dots, 19 \tag{8}$$

At the second level of nesting, domestic production $DomProd_j$ is obtained by combining the use of intermediate goods and value-added in fixed proportions using Leontief technology.

$$DomProd_j = min\left(\frac{X_{1j}}{a_{1j}}, \frac{X_{2j}}{a_{2j}}, \dots., \frac{X_{19j}}{a_{19j}}, \frac{VA_j}{v_j}\right) \qquad \text{where} \quad j = 1, 2, \dots, 19 \tag{9}$$

where X_{ij} are the quantities of good i required for the domestic production of good j; a_{ij} is the requirement of good i to produce one unit of good of sector j, i.e., they are the equivalents of the technical coefficients; VA_j is the value added by sector j; and v_j is the amount of value-added required to produce one unit of good j.

In the third level of nesting, the value-added VA_j for each sector j is simulated by combining the primary factors labour L and capital K using a Leontief technology of fixed coefficients.

$$VA_j = min\left(\frac{K_j}{k_j}, \frac{L_j}{l_j}\right) \qquad \text{where} \quad j = 1, 2, \dots, 19 \tag{10}$$

3.3 Government

The government comprises public institutions that demand goods and services and collect taxes. Its main sources of income are capital income, tax revenues, and transactions with the rest of the world. In addition, it has expenditures for social benefits, transfers, purchases of public goods and services, investments, and transfers to the rest of the world.

The government receives income from production as follows:

$$IndTaxPn = \sum_{j=1}^{19} T_j \left(\sum_{i=1}^{19} a_{ij}\, p_i DomProd_j + \Big(\big(1 + SC_j\big) w\, l_j + r\, k_j \Big) VA_j \right) \tag{11}$$

$IndTaxPn$ is the collection of indirect taxes on production, where T_j is the tax rate on production, SC_j are the social contributions and a_{ij} are the technical coefficients of domestic intermediate goods.

In addition, the government taxes the labour use of the productive sectors. The revenue from the use of labour CTS is represented as follows:

$$CTS = \sum_{1}^{19} SC_j\, w\, l_j\, VA_j \tag{12}$$

VAT on the 19 goods and services produced in the economy and demanded by households is collected indirectly as follows:

$$CVAT = \sum_{1}^{19} \sum TVAT_j \big(1 + T_j\big) \left(\sum_{1}^{19} a_{ij} p_i DomProd_j + \Big(\big(1 + SC_j\big) w\, l_j + r\, k_j \Big)\, VA_j \right) + \sum_{1}^{19} VAT\big(1 + t_J\big) prw\, a_{mj}\, Q_j \tag{13}$$

where CVAT is the indirect VAT collection and VAT_j is the ad valorem tax rate on good j that taxes all production, both domestic and foreign.

The CIT income tax is obtained as follows:

$$CIT = PIT\ (w\ L + r\ K + cpi\ TSG + TRoW) \tag{14}$$

In this, CIT is the tax rate on consumers' income from the sale of their productive factors, labour L and capital K, from transfers received by the government TSG and from transfers from the rest of the world $TRoW$.

Finally, total government revenue is given by:

$$CG = IndTaxPn + CTS + CVAT + CIT \tag{15}$$

In this model, we have considered keeping the level of government activity constant; therefore, both government transfers to households and public consumption are distinguished as exogenous variables. On the other hand, the public deficit or surplus PD is endogenously determined as the difference between its revenues and its expenditure as follows:

$$PD = CG - TSP\ cpi - Savg - \sum_{j=1}^{19} GD_j\ P_j \tag{16}$$

where GD_j is the demand for government goods and services, TSP includes transfers to households and from the rest of the world, cpi is a consumer price index and $Savg$ includes public savings. The latter equation constitutes a macroeconomic closure.

3.4 Foreign sector

The foreign sector represents the rest of the world with which Mexico has trade relations, making it a single aggregate account. The foreign sector buys and sells goods and services with domestic producers and makes transfers between agents in the economy.

Therefore, the foreign sector deficit or surplus is determined endogenously as follows:

$$\begin{aligned} &DRoW \\ &= prw \sum_{j=1}^{19} Import_j + TRANSFhou - TRoW \\ &- prw \sum_{j=1}^{19} Export_j \end{aligned} \tag{17}$$

where $Import_j$ are the imports of foreign goods of sector *j*, $Export_j$ are the exports of goods of sector *j*, *prw* is a weighted price index for the change in prices of imported goods or services and TRoW is the transfers from abroad to consumers.

The fact that the trade balance is endogenous implies that the account is balanced by transferring its balance to the savings-investment account.

3.5 Consumers

There are 10 consumers represented by deciles of households and 19 types of differentiated goods corresponding to the productive sectors. Consumers demand goods for present consumption, leaving the rest of their disposable income as savings. Their consumption is financed by the sale of their initial endowments of productive factors, labour *L* and capital *K*, and they receive a wage *w* and a return on capital *r*. In addition, they receive transfers from the government *TSP* and income from the foreign sector, *TRoW*. Consequently, their disposable income is:

$$Y_{Disp} = Gross\ Income - Total\ Direct\ Taxes$$

$$Y_{Disp} = w\,L + r\,K + ipc\,TSP + TRoW - IT\,(r\,K + cpi\,TSP + TRoW) - IT\,(w\,L) \quad (18)$$

where *cpi* is a consumer price index calculated as the weighted sum of the consumption of each good concerning the total by the final prices of each good. Each consumer maximises his utility of consumption and saving goods restricted to his disposable income.

The equations that determine the optimal consumption and savings demand levels are obtained by maximising the following optimisation problem:

$$Max\ U\left(CD_j, Dsavg\right) = \sum_{j=1}^{19} CD_j^{\alpha}\ Dsavg^{\beta}$$

$$s.a.\ Y_{Disp} = (1 - IT)(r\,K + cpi\,TSP + TRoW) - (1 - IT + IT\,CO - CO)w\,L \quad (19)$$

where CD_j is the consumption of goods of product j, $Dsavg$ goes to savings and α and β are participation coefficients corresponding to the different consumption and savings goods.

3.6 Saving-investment

Savings investment is included as a macroeconomic closure. Savings are considered an exogenous component; consequently, investment is endogenously delimited. Investment is defined as the purchase of capital goods and is a component of final demand. In equilibrium, the macroeconomic equality between savings at the aggregate level and total investment of the economy must be fulfilled in the following way:

$$\sum_{j=1}^{19} I_i\ p_{inv} = Dsavg\ p_{inv} + PD + DRoW \quad (20)$$

The levels of government and foreign sector activity are considered to be fixed, while relative prices, the levels of activity of the productive sectors, and public and foreign deficits function as endogenous variables.

Economic equilibrium will be a state where consumers maximise their utility, the productive sectors maximise their profits net of taxes and government revenues

correspond to the payments made by economic agents. At this point of equilibrium, demand should equal supply in all markets.

This model reproduces the Mexican economy in a steady state, in which the demand and supply functions of all goods are obtained from the maximisation of utility and profit optimisation problems. The result is a vector of goods and factor prices, activity levels and taxes collected that satisfies the above conditions.

4. Simulations and results

This section simulates the sectoral economic effects of CCTs from the Prospera program, as well as their effects on poverty and inequality indices, using the CGEMEX constructed for the Mexican economy. The main contribution is the proposed simulation since there is little research, and what exists is outdated, measuring the effects of CCTs on the sectoral economy, output in terms of GDP, and poverty and inequality.

4.1 Simulation applied to the Mexican economy

For the simulation, we used a vector that includes the CCTs of the Prospera program received by Mexican households. According to the Federal Expenditure Budget, the programmed budget was 4,467,225.8 million pesos (28.65% as a proportion of GDP), of which 78.2% of programmable spending, that is, 2,043,045.6 million pesos (13.10% as a proportion of GDP), was allocated to social development (58.5% of programmable spending). The Prospera program for 2014 allocated 72,652.827 million pesos (0.46% as a proportion of GDP).

According to the Federal Expenditure Budget for 2014, the original budget allocation for the Prospera program for social development was 38,551.824 million pesos. Of this budget, expansions of 2,000 million pesos and reductions of 6,257.614 million pesos were reported, resulting in an authorised modified budget of 34,294.209 million pesos, which was executed in its entirety.

Based on the ENIGH for 2014, household monetary income was mainly composed of remuneration for subordinate work and income from self-employment, income from other work, property rent, etc., in addition to other current income.

Current monetary income of households is mainly composed of remuneration for subordinate work, with 68.6% of the total and in greater proportion for the last five income deciles. Similarly, transfers are the second-largest component of total current income, representing 14.5% of total income. Note that this item presents a greater weight for the first income deciles, especially for decile I, with almost three times the proportion of decile X.

SHCP (2014) collected the distribution of tax payments and receipt of public spending by deciles of households and individuals for the year 2014, and with these data, we constructed the simulation that collects the amounts represented by the CCTs by the PROSPERA program to Mexican households (see Table 2). The total amount transferred to households was 31,415.55 million pesos or 0.20% of GDP for 2014. This amount is

allocated according to the percentage distribution of public spending on social protection per capita for 2014.

Although these transfers are targeted to the lowest income deciles, all deciles receive income from Prospera CCTs, including the highest income deciles. For example, decile 10 receives 0.1% of total CCTs, which at the same time represents 2.75% of all transfers received by decile 10, a situation that shows inadequate targeting of beneficiary households.

The vector represents the simulation of the exogenous impact of the Mexican economy without CCTs by the Prospera program, with which, through comparative statics, a benchmark is made between the initial equilibrium scenario of the economy and the scenario without CCTs.

Table 2. CCTs received by households. Impact vector for 2014, million pesos

Deciles	Share	CCTs
I	0.246	8,344.78
II	0.212	7,191.44
III	0.177	6,004.17
IV	0.121	4,104.55
V	0.108	3,663.56
VI	0.075	2,544.14
VII	0.043	1,458.64
VIII	0.014	474.91
IX	0.003	101.77
X	0.001	33.92
Total	1.000	33,921.87
	31,415.55	

Source: Own elaboration based on the distribution of tax payments and receipt of public spending by deciles of households and individuals for 2014 (SHCP, 2014).

4.2 The Mexican economy without CCTs to households

This simulation consists of modifying household income by eliminating the amount received by CCTs from the Prospera program. Below, we present the main effects when comparing the two scenarios: the Mexican economy with CCTs from the Prospera program and the Mexican economy without the transfers.

Table 3 presents the changes in the main macro magnitudes. It shows the rates of change of each of the GDP components from the point of view of expenditure and income in the two simulated scenarios.

Table 3. Changes in the macro magnitudes of the Mexican economy, million pesos.

Macro magnitudes	With transfers	Without transfers	Rate of change %
Consumption	10,700,710	10,601,590	-0.93
Investment	3,414,936	3,417,085	0.06
Public spending	1,341,212	1,340,310	-0.07

Macro magnitudes	With transfers	Without transfers	Rate of change %
Foreign demand	-503,747	-499,886	-0.77
Expenditure GDP	14,953,111	14,859,099	-0.63
Wages	3,898,646	3,898,645	0.00
Capital	10,805,071	10,710,147	-0.89
Tax collection	249,394	250,307	0.36
Income GDP	14,953,111	14,859,099	-0.63

Source: Own elaboration

With the elimination of the CCTs, the GDP presented a reduction of 0.63%, mainly affecting consumption with a variation of -0.93% and capital with -0.89%. Public spending presented a variation of -0.07% due to the nontransfer of resources to poor households.

Likewise, labour remunerations are not affected by this measure, highlighting the low participation of salaries in income, so the variation in consumption is explained by the variation in capital remuneration. In addition, the effect on investment and tax collections is positive, producing an increase of 0.06% and 0.36%, respectively. However, the latter is due to the increase in the collection of the employer's social security contribution. However, taxes on production would be reduced by 0.64%, while VAT presents a reduction of 0.71%, possibly due to the reduction in consumption (see Table 4).

Table 4. Changes presented in tax collection, million pesos.

Tax collection	With transfers	Without transfers	Rate of change %
Employer´s social security	317,931	318,304	0.12
Production taxes	84,629	84,089	-0.64
Value-added tax	-153,166	-152,086	-0.71
Tax collection	249,394	250,307	0.36

Source: Own elaboration.

Disposable income presents a variation rate of -0.90%, equivalent to a reduction in income of 116,483 million pesos (Table 5). Consequently, for obvious reasons, when withdrawing CCTs from households, disposable income would be affected, on the one hand, by the direct impact on their income and, on the other hand, by the impact derived from the secondary effects resulting from the circular flow of income.

Table 5 shows that the first three income deciles are the most affected, with the highest variation rate being decile I with -3.16%, equivalent to 10,813 million pesos, followed by decile II with a rate of change of -2.19%, equivalent to 10,482 million pesos, and decile III with a rate of change of -1.67%, equivalent to 9,687 million pesos.

Table 5. Rate of change in household income by income decile, million pesos

Deciles	With transfers	Without transfers	Rate of change %
I	353,172	342,359	-3.16

II	489,402	478,920	-2.19
III	588,474	578,787	-1.67
IV	693,220	684,810	-1.23
V	842,984	834,172	-1.06
VI	969,484	961,088	-0.87
VII	1,204,850	1,195,981	-0.74
VIII	1,463,520	1,454,127	-0.65
IX	1,931,557	1,919,825	-0.61
X	4,529,768	4,499,880	-0.66
Total income	13,066,431	12,949,948	-0.90

Source: Own elaboration.

Concerning the other deciles, their incomes are affected to a lesser extent. Thus, in the hypothetical scenario of the elimination of CCTs, the most affected would be households and their purchasing power, which could have an impact on their welfare in the short term and on their generation of capabilities in the long term.

The productive sectors are also affected by the elimination of CCTs due to the circular flow of income. Given a reduction in consumer income, the output of the productive sectors would be reduced by 0.58%, as shown in Table 5, which is equivalent to 144,797 million pesos. This result is interesting since if CCTs are used to activate the economy through consumption, eliminating the transfers would directly affect the purchasing power of households, which, due to the circular flow of income, would directly impact the total output of the economic sectors.

Although this result seems to have a low impact, compared to the impact on GDP with a variation of -0.65%, it is reduced in greater proportion than the amount allocated from the budget for CCTs, which was 0.20% of GDP.

Table 6 shows that the productive sectors that are mainly affected by the hypothetical elimination of CCTs are cultural and sports entertainment services (16) with a variation of -1.10%, temporary accommodation and sports services (17) with a variation of -1.07%, other services[12] (18) with a variation of -1.01% and mass media information (8) with a variation of -0.92%.

Table 6. Variation in total output of productive sectors, million pesos

	Productive sectors	With transfers	Without transfers	Rate of change %
1	Agriculture and farm animals	762,888	759,354	-0.46
2	Mining	1,582,428	1,578,472	-0.25
3	Generation, transmission, and distribution of electric power	462,230	458,734	-0.76
4	Construction	2,285,165	2,285,049	-0.01

[12] Other services include activities related to repair and maintenance, personal services such as beauty salons, laundries, funeral services, parking lots, associations and organizations, and domestic employees (INEGI, 2013).

5	Manufacturing industries	9,025,227	8,978,792	-0.51
6	Trade	3,103,125	3,081,517	-0.70
7	Transport, mail and storage	1,562,271	1,550,250	-0.77
8	Mass media information	553,573	548,484	-0.92
9	Financial and insurance services	782,397	775,456	-0.89
10	Real estate services	1,954,525	1,933,538	-1.07
11	Professional, scientific, and technical services	458,301	455,812	-0.54
12	Corporate	100,463	99,812	-0.65
13	Business support services	580,521	576,746	-0.65
14	Educational services	708,720	706,966	-0.25
15	Health and social services	486,128	484,494	-0.34
16	Cultural and sports recreation service	89,712	88,729	-1.10
17	Temporary housing services	464,423	459,435	-1.07
18	Other services	428,320	424,012	-1.01
19	Legislative activities	919,249	919,214	0
	Total	26,309,665	26,164,868	-0.58

Source: Own elaboration.

On the other hand, the least affected sectors are legislative activities and construction with a 0.01% variation, mining with a 0.25% variation, educational services with a 0.25% variation, and health services with a 0.34% variation.

In summary, the results show that households spend their extra resources on other types of activities, such as recreation. Other sectors that could be affected, but to a lesser extent, are the manufacturing industry and the primary sector, since the lack of additional income reduces households' purchasing power, affecting their consumption[13].

Regarding the first part of the objective, it is concluded that a scenario without CCTs would harm the Mexican economy. After the process of income redistribution based on the circular flow of income, eliminating the transfers would result in a 0.63% reduction in GDP, reflecting a contraction of economic activity.

This implies that disposable income decreases by 0.90%, which is manifested in a reduction of consumption of 0.93%. It also affects the total output of the economy with a 0.58% reduction because of the high participation of the different CCTs in household income, with an average proportion of 14.5%. For decile I, the CCTs represent 43% of their monetary income, for decile II 29%, and for decile III 20%.

4.3 Impact analysis on the poverty and inequality index

Based on the results on the economic impact of household income disaggregated by deciles, the effects of the hypothetical elimination of CCTs on inequality measured by the

[13] As already noted, private consumption was reduced by 1.21%.

Gini index and the poverty index measured by the FGT index are determined through a microsimulation model.

The Gini index is calculated for pooled data (Medina, 2011). It varies between 0 and 1, where 0 indicates perfect equality, i.e., all individuals have the same income, while a value of 1 refers to perfect inequality, i.e., only one individual has all the income, and the others have none.

To measure poverty, we use the FGT index constructed by Foster, Greer, and Thorbecke (1984), where the values $\propto$ take on different meanings: When $\propto=0$, we obtain the percentage of people living in monetary poverty. When $\propto=1$, we obtain the poverty gap, i.e., the average percentage by which the poor must increase their income to rise above the poverty line. $\propto=2$ is a measure of the severity of poverty, which represents the distribution of per capita expenditures among the poor. The parameter of this index is an indicator of poverty aversion, which relates a measure of inequality and the income gap ratio in the same sense as Sen (1976).

For the analysis of inequality and poverty, we start from the rate of variation of household income presented in Table 6 of the previous section, obtaining the results in Table 7.

Table 7. Income distribution analysis for the Mexican economy, pesos

Decile	Income share	The average quarterly income per capita		
		With transfers	Without transfers	Rate of change %
I	1.39	1,919	1,871	-2.52
II	2.49	3,430	3,366	-1.88
III	3.37	4,647	4,576	-1.53
IV	4.27	5,873	5,796	-1.31
V	5.28	7,264	7,181	-1.15
VI	6.55	9,012	8,917	-1.06
VII	8.33	11,474	11,364	-0.96
VIII	10.93	15,043	14,910	-0.88
IX	15.99	22,033	21,865	-0.76
X	41.40	56,912	56,535	-0.66
Gini index		**0.505618**	**0.507160**	

Source: Own elaboration.

Table 7 shows that decile X represents 41.4% of total household income in Mexico and decile I represents only 1.39%, indicating a high-income concentration that is reflected in the Gini index. With the elimination of the CCTs from the program, income distribution remains at the same level as before the change, with a rate of change of 0.3%. In other words, the Mexican economy continues to show the same inequality indices, reflecting an environment of significant inequality.

However, it can be observed that the average quarterly income per inhabitant has improved, especially for the first four deciles. Decile I shows a 2.52% drop in its quarterly per capita income, a situation that could signify a sustained deterioration in its quality of

life. Similarly, deciles II, III, IV, V, and VI exhibit a drop of more than 1% in their quarterly per capita income, generating the same consequences.

On the other hand, for the calculation of the FGT index, the microdata provided by INEGI from the ENIGH for 2014 were used. For this, the average between the rural and urban moderate per capita poverty line of 6,268.28 pesos per quarter and the average of the rural and urban extreme per capita poverty line of 3,177.21 pesos per quarter for 2014 were used (see Table 8).

Table 8. Per capita poverty analysis per household for Mexico, 2014

With transfers	**Moderate poverty**			**Extreme poverty**		
	Headcount	**α=1**	**α=2**	***Headcount***	**α=1**	**α=2**
Aggregate	50.00	21.42	11.96	19.15	6.43	3.11
Without transfers	**Moderate poverty**			**Extreme poverty**		
	Headcount	**α=1**	**α=2**	***Headcount***	**α=1**	**α=2**
Aggregate	50.63	21.85	12.29	19.62	6.71	3.28
Level of significance	Not significant	*	*	Not significant	*	*

Hypothesis tests are two-tailed, with a significance level of 0.05*

Source: Own elaboration with data from ENIGH for 2014.

Table 8 shows that poverty levels increase by less than 1% when CCTs are removed from households. In aggregate, the incidence rate of moderate and extreme poverty does not show a statistically significant increase. For moderate poverty, the intensity index increases by 0.43%, and the poverty severity index increases by 0.33%, from 11.96% to 12.29%, both of which are statistically significant. For extreme poverty, its indices also increased, but to a lesser extent than moderate poverty, with the intensity index increasing by 0.28% and the severity index by 0.17%, both being statistically significant.

Therefore, compliance with the redistributive purpose of the program is questionable since the level of inequality remains below the same proportions of the CCT scenario and the first three deciles represent only 7.25% of the total income of the population. Although the calculated poverty indices decrease, the percentage of those in poverty is not affected, which shows that the CCTs are only palliative to avoid increasing the gap and the severity of poverty without fulfilling their purpose in the long term. The latter two show a statistically significant increase of less than 1%, which is not very proportional to the importance given by the national government to this type of social policy, the amounts invested, and the high poverty rates. The fact that both the incidence and severity show a statistically significant increase indicates that this measure does not equitably impact income distribution and only prevents poverty from worsening.

5. Conclusions

From the analysis of the economic impact of the elimination of CCTs, it was found that both consumption and capital presented a reduction of close to 1%; labour remunerations did not present any variation. This behaviour of the variables highlights the low participation of wages in consumer income, benefiting capital in redistributive terms. This situation is corroborated when analysing the composition of household monetary income, where it was found that the income of the first decile bears practically the same proportion of income from paid work and income from CCTs.

Similarly, there is a slight increase in investment (0.06%) because of the decrease in consumption. Since investment is equal to savings, a small part of what is not consumed would tend to be saved; however, since this component of final demand is that with the least weight, the increase presented could be assumed to be marginal and not a consequence of economic activity. That is, the elimination of CCTs does not affect labour remuneration, so that the variation in consumption is explained by the variation in the remuneration of capital.

From the productive sectors, it was found that those most affected belong to the tertiary sector, influencing the first five deciles of households in the country. This is particularly reflected in activities related to recreation, housing rentals, other services, and sectors identified as drivers (except for housing rentals), classified as key in the economy.

Other sectors that could be affected, although to a lesser extent, are the manufacturing industry (strategic sector with a greater direct effect) and the primary sector (driving sector) since the lack of this income reduces the population's purchasing power. These are identified as the main suppliers of goods for households with a high productive interrelation. Therefore, the effect of exogenous flows on household income benefits the productive sectors (variation of 0.58%) relatively more than workers via labour remuneration (no variation before the impact).

Likewise, the impact on total sectoral production (0.58% reduction) and GDP (0.65% reduction) shows how, from the demand side, the behaviour of household consumption energises the economy; with the elimination of the CCTs, there is a negative impact when compared to the amount allocated to the program to combat poverty (0.20% as a proportion of GDP), responding to the first research objective.

In terms of the income distribution, 41.4% of total household income is concentrated in decile X, while only 1.39% is concentrated in decile I, reflecting a high level of income concentration. When the CCTs of the Prospera program (counterfactual simulation) are extracted from the Mexican economy, income inequality does not show major changes. In other words, the Mexican economy both under the Prospera program transfer scheme and in a scenario without these transfers continues to show the same inequality index, reflecting relative inequality, even though disposable income is reduced by 0.90%.

On the other hand, the results indicate that with the elimination of CCTs, both moderate and extreme poverty does not present a statistically significant change; however, both the

intensity and severity of poverty do, with statistically significant increases of 0.43% and 0.33%. This reflects that the CCT programs only function as a palliative via income; the transfers avoid exacerbating poverty but do not provide a solution to the problem of poverty, ostensibly the program's main objective.

From the findings, it can be concluded that the real problem derives from the productive system since it is in production where the original distribution of income arises. The tendency of low labour participation in income prevents an adequate distribution, where CCTs only mask the real problem and prevent poverty from worsening. CCTs soften the low participation of wages in income but do not modify the redistributive process, benefiting the payment of capital through consumption.

Furthermore, the results show that the program's redistributive objective is not being achieved as expected, even though the elimination of the CCTs would seem to have a major impact on families belonging to the lowest deciles. For the sectoral economic impact, it is observed that CCTs contribute to the stimulation of the economy through demand, which, together with programs focused on key, strategic, and driving sectors and better practices in household wage participation, would bring positive effects to all the agents that make up the Mexican economy.

In general, it is concluded that economic policies based on transfers to households have proven to have a positive impact on the economy. Nevertheless, they hide the real problem rooted in the productive system—the low participation of wages. In the long term, the household transfers prevent poverty from worsening but reduce neither the population in poverty nor inequality.

The simulation provides evidence of the effects of the program beyond providing additional income to households. This result, together with the impact on productivity, reveals the relevance of proposing and evaluating public policies that promote greater productivity reflected in household welfare.

In this sense, the study suggests designing a policy that encourages the primary sector, manufacturing industries, health, and education. The manufacturing industries are classified as strategic sectors, while the other three are classified as driving sectors. In addition to having the greatest direct effect on the Mexican economy, reclassifying these sectors would create a virtuous circle of income generation to reduce poverty and inequality levels and increase national productivity (including citation) more efficiently. Likewise, better targeting of the households that benefit from programs of this type is recommended.

Finally, we propose training programs in personal finance and human capital development. Households do not invest the additional income in capacity building when they receive an income increase, which is the long-term purpose of the Prospera program. If beneficiary households invested more in their assets to help them generate human capital, they could increase the probability of escaping poverty in the medium or long term.

As is well known, applying an economic policy impacts the population's well-being regardless of its objective. In contrast, there is limited research on the economic impact of a social policy, which is the contribution of this research to the literature regarding the evaluation of social policies, such as CCTs, which are widely used in Latin America and the Caribbean.

CCTs generate changes in households' disposable income, demand, savings or investment and consumption, which impact production. Hence, their evaluation should consider macroeconomic indicators and the population's quality of life. This could be extended to understanding the impact of social investment and its usefulness as a tool in periods of crisis, being one of the great lessons learned. On the one hand, when understood as a social investment (instead of public spending), it dynamises production while increasing households' disposable income and keeping their purchasing power, thus reducing the impact of the crisis.

Although CCTs do not have economic objectives as their main objective, the economic approach is useful for government and social policymakers to design comprehensive social policies, in which multi-sectoral modelling is an appropriate tool for its measurement.

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ANNEXES

ANNEX 1. THE SOCIAL ACCOUNTING MATRIX

A SAM considers the structure, the composition of production, the value added generated by production, and the income distribution among all the sectors that make up the economy. It is constructed based on information from the input-output table and the national accounts, allowing for the circular flow of income. It fulfils the basic macroeconomic and microeconomic identities by respecting the underlying equilibrium conditions that are subsequently reflected endogenously when a general equilibrium model is implemented.

The economic behaviour presented in the SAM follows the schematical representation showed in Table 9. The first three submatrices summarize the transactions between agents of the economy and must comply with the accounting identity in which total gross production is equal to total demand.

Table 9. Outline of a Social Accounting Matrix

	Production	Factors of production	Institutional Sectors	Capital	Rest of the World
Production	Intermediate consumption		Consumption of the public sector and households	Gross capital formation	Exports
Factors of production	VA payments to factors of production				
Institutional Sectors	Taxes /activities, goods and services	Allocation of factor income to institutional sectors	Current transfers between institutional sectors	Taxes on capital goods	Transfers from the RoW
Capital		Consumption of fixed capital	Institutional sector savings		Foreign savings
Rest of the World	Imports		Transfers to the RoW		

Source: own elaboration.

From Table 9, the flow of economic transactions is displayed, which, for methodological purposes, are separated into four sub-matrices:

1. Intermediate consumption matrix includes transactions of intermediate goods and services between productive activities. The sum of each column shows the purchase of goods made by each activity and the sum of each row represents the sales made by each activity.

2. Primary factors matrix includes the breakdown of resources used by each productive activity. That is, it corresponds to the added value of the factors, taxes on the activities that produce goods and services, and imports.

3. Final use matrix includes the final consumption of the institutional sectors (consumers and public administration) as well as gross capital formation and exports.

These submatrices must comply with the accounting identity that demonstrates the equality between total gross production and final demand. The main source of information for these three submatrices is the input-output table supplemented with the national accounts.

4. Closure matrix relates added value with final demand. The most demanding part is the definition of consumer income and spending due to the existing heterogeneity between the different sources of official statistical data. The specification of spending is complemented by taxes and savings. The definition of income is complemented by the inclusion of social benefits, transfers from abroad and government transfers.