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# IMF Working Paper

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## Income Inequality and Government Transfers in Mexico

by Frederic Lambert and Hyunmin Park

*IMF Working Papers* describe research in progress by the author(s) and are published to elicit comments and to encourage debate. The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

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## IMF Working Paper

Western Hemisphere Department

### Income Inequality and Government Transfers in Mexico

Prepared by Frederic Lambert and Hyunmin Park<sup>1</sup>

Authorized for distribution by Costas Christou

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### Abstract

We analyze microdata from Mexico's survey on household income and expenditures (ENIGH) to study the evolution of income inequality in Mexico over 2004-16, identify its sources, and investigate how it was affected by government social policy. We find evidence of only a small decline in inequality over this period. The observed decline may be attributed to government transfers, notably targeted cash transfers (*Prospera*) and non-contributory pensions. In 2016, those two programs accounted for more than two thirds of the reduction in the Gini coefficient due to government transfers. Other transfer programs such as farmland subsidies (*Proagro*), government scholarships, and non-monetary transfers for medical expenditures have not been as effective.

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# 1 Introduction

The evolution of income inequality in Mexico over the past twenty years is subject to debate. Many authors (López-Calva and Lustig, 2010; Lustig et al., 2011; IMF, 2018) have documented an overall decline in inequality in Latin American countries including Mexico since the mid-1990s, driven in particular by real labor income gains for lower-skilled workers. In Mexico, this fall in inequality has sometimes been associated with the implementation of the North American Free Trade Agreement in 1994, which may have contributed to a reduction in the skill premium (Lustig et al., 2011). Still, Campos et al. (2012) argue that the decline in inequality in Mexico slowed after 2006, and Scott et al. (2017) report a relatively flat Gini coefficient for household income over the period 2002-2016. Using survey data adjusted to match income totals from the national accounts statistics, del Castillo Negrete Rovira (2017) actually find an increase in inequality over the last decade, while Cortès (2013) argues that there is not enough empirical evidence of a declining trend in inequality.

This paper takes a fresh look at this issue, focusing on the last twelve years. We use household income and expenditure data from the National Survey of Household Income and Expenditure (*Encuesta Nacional de Ingresos y Gastos de los Hogares* or ENIGH) conducted by Mexico's national statistical office INEGI. We find that the level of income inequality in Mexico in 2016 is comparable to that of other Latin American countries but significantly higher than in other emerging economies and OECD countries. Contrary to the declining trend observed in other countries in the region, income inequality in Mexico has barely changed since 2004, despite a drop in poverty. A fifth of income inequality can be traced back to inequality between households of different education levels,<sup>1</sup> a finding consistent with the fact that labor income remains the main source of inequality over the period under review. We also find that labor income inequality rose during the same period. However, the observed rise in labor income inequality has been offset by changes in other income including government transfers.

We focus on the main public transfer programs identified in ENIGH's data to investigate how social policies have affected poverty and income inequality. We consider five programs: (i) the conditional cash transfer program *Prospera*, formerly known as *Oportunidades* and *Progres*a, (ii) the non-contributory pension program for elderly adults *Programa Pensión para Adultos Mayores*, formerly called *Programa 70 y Más*, (iii) the farmland subsidies program *Proagro* (formerly *Procampo*), (iv) government scholarships, and (v) non-monetary medical transfers in the form of free or subsidized medical services provision. We provide some details on those programs below.

The social inclusion program *Prospera* was launched in 2014 to replace the program

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<sup>1</sup>In this paper, the education level of a household is determined by the education level of the head of household.

for human development *Oportunidades*, which itself replaced in 2001 the program for education, health, and nutrition *Progreso* (*Programa de Educación, Salud y Alimentación*) started in 1997. The program aims to improve the education, health, and nutrition of poor families. The target population are households whose socioeconomic and income conditions impede the development of their members in terms of nutrition, health, and education. Monetary transfers are conditioned on human-capital investment, assessed through school attendance of children and completion of regular health checkups (Dávila Lárraga, 2016). The program's beneficiaries receive cash transfers and various in-kind benefits related to the three priorities of the program (education, health, and nutrition). More than 6.5 million households were receiving benefits from *Prospera* in 2017 (CONEVAL, 2018).

The pension program for older adults or *Programa Pensión para Adultos Mayores* began in 2007 under the name *Programa 70 y Más* and initially aimed to provide a pension to every person above 70 in rural areas. In 2012, the coverage was expanded to the whole country and to all adults above 70 who did not receive a retirement or disability pension greater than a certain limit. In 2013, the minimum age for benefit eligibility was reduced to 65. About 5.1 million people were receiving a pension from the program in 2017.

*Proagro* is the latest version of an agricultural support program, *Procampo*, initiated in 1993 to facilitate the transition under the North American Free Trade Agreement from a system of guaranteed prices to more market-oriented policies. The program was renamed *Procampo Productivo* in 2013 as new provisions were introduced to better link subsidies to actual production. It became *Proagro Productivo* in 2014. Under *Proagro*, beneficiaries have to commit to use the subsidies for the purchase of agricultural inputs, machines, training, technical assistance, insurance or price coverage, among other things. About 1.5 million people benefit from the program.

Government scholarships are provided through several programs administered by the Ministry of Public Education for primary, secondary and tertiary education (National Scholarship Program), and by the National Council of Science and Technology (CONACYT) for postgraduate studies. Scholarships are granted based on social, economic, or academic criteria. There were about 1.8 million recipients of scholarships from the National Scholarship Program and 61,384 postgraduate scholars in 2017 (CONEVAL, 2018).

Non-monetary medical transfers are provided through social security institutions or the social protection system *Seguro Popular*. The latter was created in 2003 to provide universal medical insurance coverage for the share of population not already covered by a social security scheme. Social security institutions include the Mexican Institute of Social Security (IMSS) which insures private sector workers, the Institute of Social Security and Services for Government Workers (ISSSTE) for federal and state government employees, and special schemes for some government agencies and state-owned enterprises such as Pemex, the army (ISSFAM) and the navy. Each scheme has its own network of healthcare

providers, from which beneficiaries can receive services.

In 2016, the five programs just described accounted for roughly half of the total budget for federal social development programs reported by the National Council for the Evaluation of Social Development Policy (CONEVAL, 2016), and represented between 2 and 21/2 percent of GDP, depending on the way non-monetary medical transfers are computed.

After a modest increase over 2007-2015, total public social spending as a share of GDP fell between 2015 and 2017 as the Mexican government engaged in a fiscal consolidation effort, and is much lower than in other OECD countries (OECD, 2017). Yet, we find a significant redistributive effect of Mexico's direct transfer programs, such as *Prospera* and the non-contributory pension program for elderly adults. We show that these two programs are well targeted and progressive in absolute terms, covering better poorer households which also receive higher transfer amounts than richer households. Without *Prospera* and non-contributory pensions, the poverty index would be 2.3 percentage points higher, increasing from 18.7 to 21 percent, and the Gini coefficient would increase from 44.9 to 46.2 in 2016. Not only do these transfers reduce poverty and overall inequality, they also have an equalizing impact on *ex ante* opportunities. The other three programs are progressive only in relative terms: transfers increase with income, but represent a smaller portion of richer households' net market income—that is, their income before transfers—. While *Proagro*'s subsidies are the highest for the poorest and richest households and lower for middle-income households, government scholarships and medical non-monetary transfers are consistently higher for richer households. We compute that *Prospera*, the non-contributory pension program for elderly adults, and *Proagro* are ten times more effective at reducing income inequality than government scholarships and government transfers subsidizing healthcare consumption.<sup>2</sup>

Our results confirm earlier findings by Scott (2014) and Scott et al. (2017). Besides the effect of social transfers on inequality, those two papers also consider the redistributive effects of taxes and indirect subsidies, in particular on gasoline. In the absence of tax data in the ENIGH survey, these elements are not included in the analysis presented here. Our results are also consistent with the overall positive assessment in the literature of Mexico's conditional cash transfer program *Progres a/Oportunidades* (Parker and Todd, 2017; Parker and Vogl, 2018). Nevertheless, they also suggest there is scope for better targeting of existing social programs, such as government scholarships and non-monetary transfers for medical expenses.

The rest of this paper is organized as follows. Section 2 describes the data, explains how the main income components were computed, and spells out the key assumptions made in the analysis. Section 3 provides an overview of income inequality in Mexico

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<sup>2</sup>Our calculation does not account for the dynamic and long-term effects of government scholarships and healthcare subsidies.

and of the changes observed over the past fifteen years. Section 4 presents the results of the benefit incidence analysis of government transfers. Section 5 discusses government scholarships and medical transfers in more detail. Section 6 concludes.

## 2 Data

We use household income and expenditure data from the National Survey of Household Income and Expenditure (*Encuesta Nacional de Ingresos y Gastos de los Hogares* or ENIGH) conducted by Mexico's national statistical office INEGI. Designed initially to collect data for calculating the consumer price index weights, the survey includes detailed information on households' income and expenditure, along with demographic characteristics of household members. The survey was first started in 1984 and has been conducted approximately every other year since 1989. A number of changes have taken place over time, in particular in the way government transfers, education, and employment industries are reported, which sometimes complicate time comparisons. Hence our decision to focus the analysis on the period after 2004. The 2016 survey sample includes 81,515 housing units ("vivienda") and 82,718 households, out of which 70,311 completed the survey.

We closely follow del Castillo Negrete Rovira (2017) to construct five income categories (wage and salary income, self-employment income, capital income, transfer income, and other income) that are consistent across years. Income is reported after taxes and includes in-kind benefits. All income amounts reported in this paper are quarterly, unless stated otherwise.<sup>3</sup>

ENIGH changed the way it recorded non-monetary income during the period under our analysis. To calculate non-monetary income as consistently as possible, we used "apoyo", the value of the item or service received, for 2008 and 2010. For years before 2008, we used the variable "gasto", the household's expenditure on the item or service. For years after 2010, we used "gasto no monetario".

We constructed government transfers by combining income and expenditure data. Transfers from *Prospera* are the sum of transfers from *Prospera* in both the income and expenditure databases. Transfers from non-contributory pensions, *Procampo* and government scholarships are recorded in the income database. "Medical non-monetary transfers" are the sum of medical expenditures in the household expenditure database where the type is "non-monetary expenditure for transfers from institutions" and the institution is either

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<sup>3</sup>The main differences between our income variables and del Castillo Negrete Rovira's are the following: (i) We combined "interests", "dividends and royalties" and "gross operating surplus" in a new category called "capital income;" (ii) We did not include imputed rent in "gross operating surplus;" (iii) For the year 2008 and later, we included in-kind transfers from institutions in "transfer income;" (iv) We included all "remuneration in-kind" in "wage and salary income", instead of dividing it between "wage and salary income" and "transfer income."

federal, state, or municipal government.

To avoid affecting our inequality measures by the inclusion of high-income outliers, we dropped observations with a total income greater or equal to 25 times the 99th percentile each year.<sup>4</sup> There are only two such observations in the year 2016 and none in the other years.

Questions about the formal/informal employment status changed over time. For 2004-2006 and 2016, we classified employees whose primary employment provided healthcare through IMSS, ISSSTE, PEMEX, SEMAR, or SEDENA, as formal employees. For 2008-2014, we classified employees whose employer provided disability benefits as formal employees.

### 3 Overview of income inequality in Mexico

#### 3.1 Evolution of income inequality

Mexico has a much higher level of income inequality than other OECD countries. The Gini coefficient in Mexico (0.45) far exceeds the OECD average (0.37) and is close to the Latin American average (Figure 1a). In Mexico, the richest 20% households have an income ten times higher than the poorest 20%, while in an average OECD country, the income of the top 20% households is about five times the income of the households belonging to the bottom 20% of the income distribution (Figure 1b).

Mexico's Gini coefficient has only slightly decreased over the past decade, from 0.47 in 2004 to 0.45 in 2016.<sup>5</sup> In contrast, the average Gini coefficient in Latin American countries has fallen substantially, by 0.05 over the same period (Figure 2a). The decrease in inequality in many Latin American countries is linked to an increase in the demand for low skilled labor caused by the international commodity price boom between 2000 and 2014 (IMF, 2018). This boom had little effect on the Mexican economy, which is more diversified and less reliant on commodity exports.

Still, average income growth was stronger for low-income households than for high-income ones, supporting a modest decrease in inequality. The average real income for households in the poorest income decile grew by 1.14% against 0.59% each year on average for households in the middle two deciles. For households in the richest decile, average real income *decreased* by 0.3% annually (Figure 2b)<sup>6</sup>.

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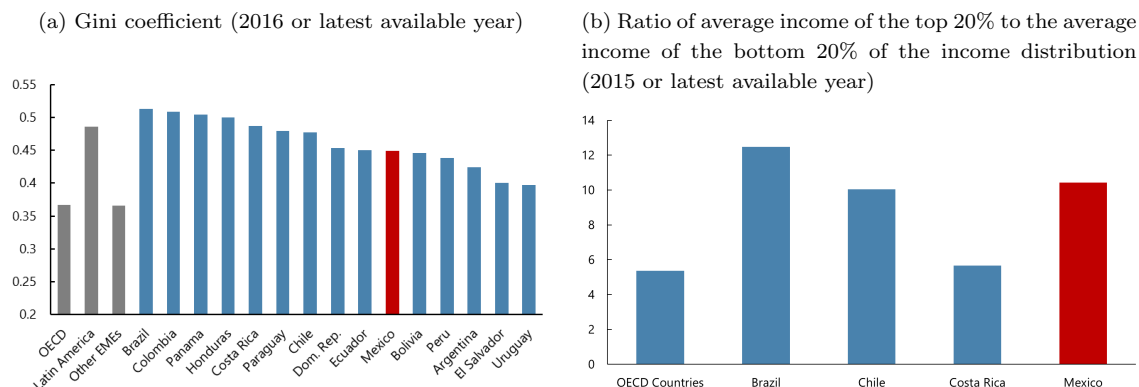
<sup>4</sup>Since the household survey data is not suitable for analyzing top incomes, we focus on the lower to middle part of the income distribution.

<sup>5</sup>This result holds when adjusting the Gini coefficient for changes in the composition of households over that period.

<sup>6</sup>The reported drop may not mean a decrease in actual income. del Castillo Negrete Rovira (2017) points out that the richest households tend to under-report their earnings and this problem might have worsened over time.



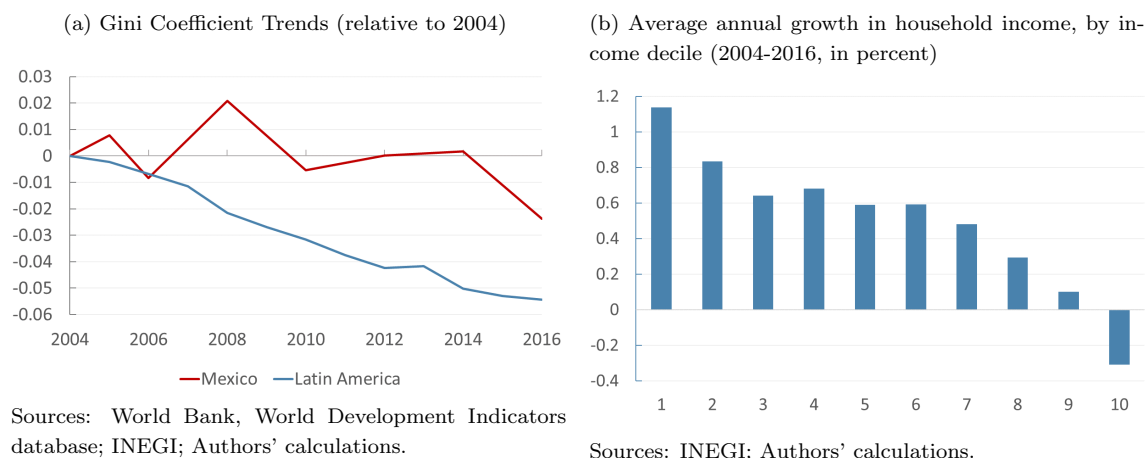
Figure 1: Inequality in Mexico - International Comparisons



Note: OECD, Latin America and Other Emerging Market Economies (EMEs) averages are weighted by each country's population. Latin America includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Honduras, Mexico, Panama, Peru, Paraguay, El Salvador, and Uruguay. Sources: World Bank, World Development Indicators database; INEGI; Authors' calculations.

Source: OECD Income Distribution Database.

Figure 2: Inequality in Mexico - Recent Trends



Sources: World Bank, World Development Indicators database; INEGI; Authors' calculations.

Sources: INEGI; Authors' calculations.

### 3.2 Inequality across states and sectors

Income inequality in Mexico tends to be commonly associated with regional inequality, especially between the North and the South of the country. To analyze the role of geographical and sectoral differences in the level in inequality, we consider another measure of inequality. The Theil index is a generalized entropy inequality measure, sometimes denoted as  $GE(1)$ , that provides an alternative measure to the Gini coefficient. It has the useful property that it can be decomposed into “between” and “within” inequalities.

Formally, the Theil index is defined as

$$T = \frac{1}{N} \sum_{i=1}^N \frac{x_i}{\bar{x}} \ln\left(\frac{x_i}{\bar{x}}\right),$$

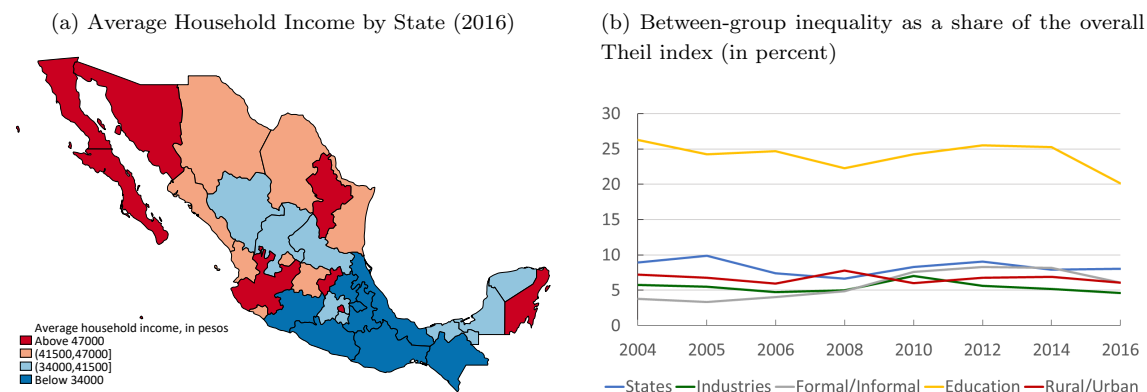
where  $x_i$  is the income of household  $i$  and  $\bar{x}$  denotes average household income. The index can be decomposed into between and within indices:

$$T = \underbrace{\sum_{j=1}^m s_j T_j}_{\text{weighted sum of within-group Theil}} + \underbrace{\frac{1}{J} \sum_{j=1}^m \frac{\bar{x}_j}{\bar{x}} \ln\left(\frac{\bar{x}_j}{\bar{x}}\right)}_{\text{between-group Theil}}$$

where the weight  $s_j = \sum_{i \in j} x_i / \sum_{i=1}^N x_i$  is proportional to the total income of each group  $j$ .

This decomposition suggests that household income inequality within states matters more than regional inequality. Despite significant differences in average income levels (Figure 3a), inequality between states is less than 10 percent of total inequality (Figure 3b). Similarly, inequalities between industries, formal vs. informal sectors, and rural vs. urban areas are not negligible but each accounts for less than 10 percent of total inequality. In contrast, inequality between different education levels is sizable and accounts for around 20 percent of total inequality, although its share has decreased between 2004 and 2016, as returns to schooling have declined.<sup>7</sup>

Figure 3: “Between” and “Within” Inequality



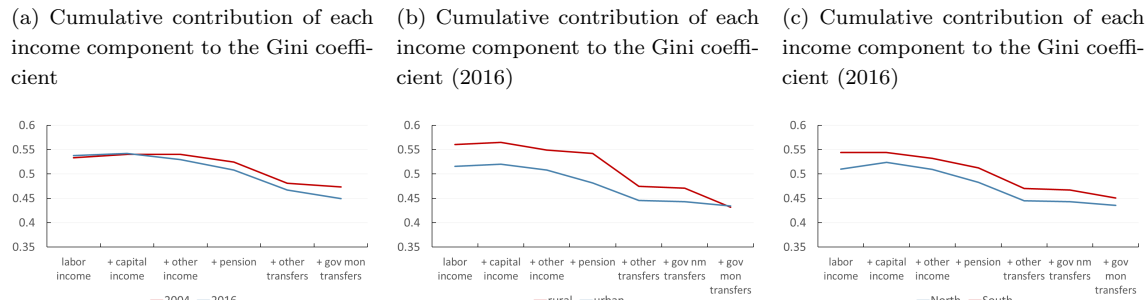
Sources: INEGI; Authors' calculations.

<sup>7</sup>Mincer regressions show a decline in the effect of secondary and tertiary education of the head of household on total household income over time (results not reported). The decline in returns to education has been attributed to the increase in the supply of skilled labor and the misallocation of resources (López-Calva and Levy, 2016).

### 3.3 Sources of inequality

Most of the income inequality comes from labor income inequality. The Gini coefficient based on labor income only (wages and self-employment income) was 0.54 in 2016 and 0.53 in 2004. Figure 4a shows how adding each income component to labor income affected the Gini coefficient in 2004 and 2016. Capital income increased income inequality, while on the contrary, public and private transfers reduced it. Government monetary transfers contributed to decreasing income inequality between 2004 and 2016: the drop in the Gini coefficient when adding government transfers to income from all other sources doubled from 0.01 in 2004 to 0.02 in 2016. Labor income inequality is higher in rural areas than in urban ones. The rural-urban gap is aggravated by contributory pensions but reduced by public and private transfers.<sup>8</sup> In the end, the Gini coefficient is only marginally higher in urban areas than in rural areas (Figure 4b). Similarly, labor income inequality is higher in the South, which is more rural, than in North Mexico. However, the reduction in inequality from other income components, notably government monetary transfers, is more pronounced in the South (Figure 4c), and the difference in the overall Gini coefficient between the two regions is small.

Figure 4: Sources of Income Inequality in Mexico



Note: “North” includes Baja California, Baja California Sur, Chihuahua, Coahuila, Durango, Nuevo Leon, Sinaloa, Sonora, and Tamaulipas. “South” includes all other states.

Sources: INEGI; Authors’ calculations.

Although measuring the effect of each income source on the Gini coefficient by adding one source at a time is intuitive and easy to understand, it is problematic because the size of the measured effect depends on the order in which we add the income sources. The so-called Shapley decomposition sidesteps this problem by measuring the effects for every possible permutation and then taking the average (see Vargas and Garriga (2015) for an application of the Shapley decomposition to changes in inequality in Bolivia). According

<sup>8</sup>Following Lustig and Higgins (2013) we treat contributory pensions as “market” income and not as government transfers because they amount to deferred income. Non-contributory pensions are included in “government monetary transfers.”

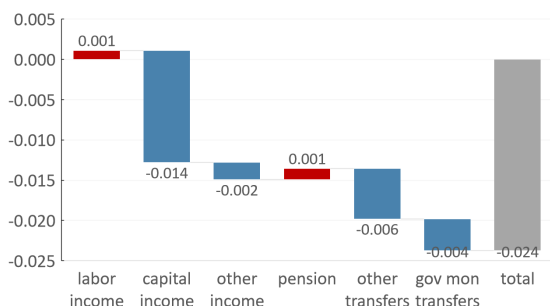
to the Shapley decomposition, labor income and contributory pensions increased the Gini coefficient by 0.001 while capital income, other income, and other transfers decreased it by 0.014, 0.002, and 0.006 respectively (Figure 5a).<sup>9</sup> Government monetary transfers were a non-negligible driver of the reduction in inequality over the period, contributing to a reduction in the Gini coefficient by 0.004.<sup>10</sup>

We use the same decomposition to analyze the fall in the poverty rate (Figure 5b). Labor income and capital income increased poverty by 1.96 and 0.38 percentage points respectively, while other income, contributory pensions, and other transfers decreased it by 1.86, 0.88, and 0.99 percentage points. Government monetary transfers account for more than half of the overall reduction in poverty, or 1.59 percentage points.

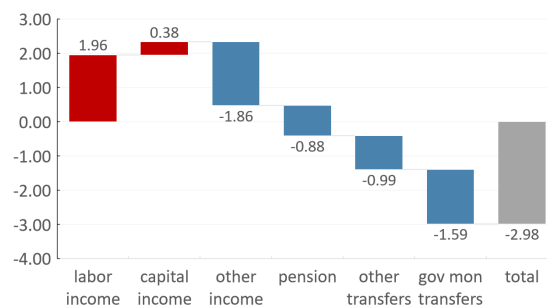
These results attest to the significant redistributive role of public transfers in Mexico. As corroborating evidence, Figure 6 shows the increase in the average monetary transfer amount per household between 2004 and 2016 along with the growing marginal effect of those transfers on the Gini coefficient. The next section investigates public transfers in more detail.

Figure 5: Changes in Income Inequality and Poverty

(a) Shapley decomposition of the change in the Gini coefficient between 2004 and 2016



(b) Shapley decomposition of the change in the poverty rate between 2004 and 2016



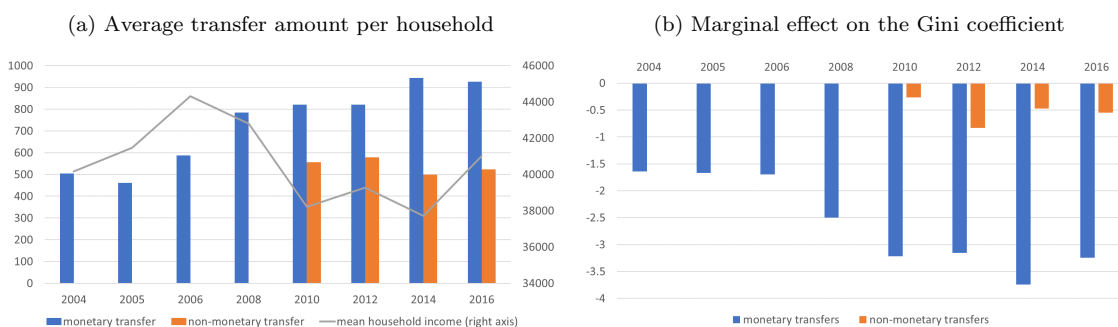
Note: We use anchored relative poverty, defined as the share of households with income that is less than half of the median income in 2004.

Sources: INEGI; Authors' calculations.

<sup>9</sup>This result may not mean that capital income actually became more equally distributed over time. Capital income tends indeed to be under-reported in ENIGH and a comparison of ENIGH data with national accounts suggests this under-reporting may have increased over time (del Castillo Negrete Rovira, 2017).

<sup>10</sup>Non-monetary transfers from the government were not separated from gifts from other households in 2004. "Other transfers" therefore include government non-monetary transfers.

Figure 6: Time trend of government transfers (2004-2016)



Note: Before 2008, government non-monetary transfers and personal non-monetary gifts were not separately recorded. Between 2008 and 2010, there was a change in the way households reported the source of non-monetary transfers. Hence we report government non-monetary transfers only for 2010 and after.

Sources: INEGI; Authors' calculations.

## 4 Benefit Incidence Analysis

This section analyzes how public transfers affect the distribution of income. We look at the effect of transfers on both poverty and inequality. We focus on five programs, for which we can compute the transfers received by households from the ENIGH survey data: (i) *Prospera*; (ii) the non-contributory pension program for elderly adults; (iii) the farmland subsidies program *Proagro*; (iv) government scholarships; and (v) non-monetary medical transfers in the form of free or subsidized medical services provision.<sup>11</sup>

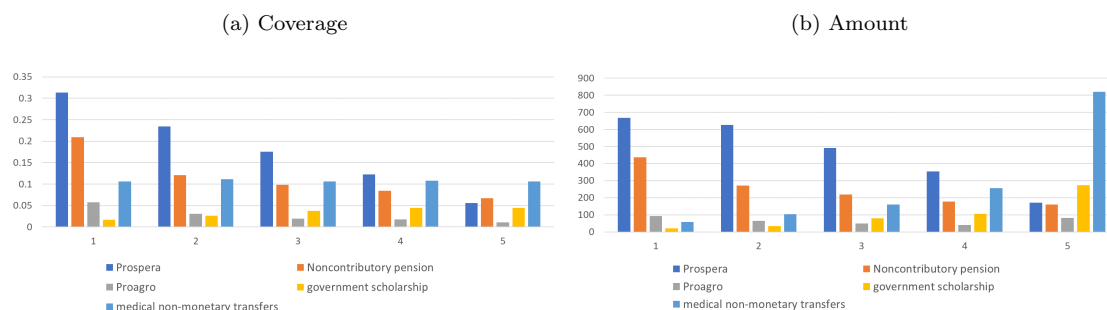
### 4.1 Coverage

Figure 7 summarizes the coverage and the amount of government transfers by household income quintile in 2016. 31 percent of the households in the bottom income quintile benefit from Mexico's conditional cash transfer program *Prospera*, in contrast to 6 percent in the fifth one. Similarly, the share of households benefiting from non-contributory pension programs is three times higher in the first income quintile than in the fifth one. For *Prospera* and non-contributory pensions, the average amount received also decreases with household income. In contrast, the farmland subsidies program *Proagro* benefits a greater share of households in the bottom income quintile than in any other quintile, but the average amount received by households in the top quintile is only marginally lower than the average transfer amount to households in the bottom quintile and higher than in the middle three quintiles. For government scholarships, both the coverage and the amount rise

<sup>11</sup>Other transfer programs are either not separately identified in ENIGH data or much smaller in size than the five ones considered in this paper.

with household income<sup>12</sup>. Non-monetary government transfers covering medical expenses benefit the same proportion of households in all five income quintiles. However, the transfer amount increases with income.

Figure 7: Government transfer programs by household income quintile (2016)



Note: Coverage is calculated at the household level.

Sources: INEGI; Authors' calculations.

We ran logit and OLS regressions to assess the effect of household characteristics on the probability of receiving a certain type of transfer and on the transfer amount in 2016. The results are summarized in Table 1 and Table 2. In general, indigenous, less educated households in rural and Southern regions or households with more members are more likely to receive a government transfer, and on average, receive a larger amount. Having an indigenous head is associated with higher chances of receiving a transfer from *Prospera* and *Proagro* as well as medical transfers, and a lower chance of receiving a government scholarship. But when we look at the average amount of transfers, having an indigenous head of household is associated with lower transfers from *Proagro* or medical transfers. This result may be explained by the design of *Proagro* whose payments to farmers remain to a large extent based on the size of the production area owned by the beneficiaries, so that smaller producers get lower subsidies. Differences in access to public medical services may account for the relatively lower medical transfers received by indigenous households. Single-adult households are less likely to receive a transfer from *Prospera*, a non-contributory pension, a subsidy from *Proagro* or medical transfers, while households with more than three adults have a greater chance of receiving all the five benefits considered in this analysis. The probability of receiving a government scholarship, medical transfers and a transfer from *Prospera* increases with the number of children in the household, presumably because the demand for scholarships and medical services increases with the number of children and the *Prospera* eligibility criteria tend to favor families with

<sup>12</sup>Even within the top quintile, the amount government scholarship increases with income. Households in the top fifth percentile of the total net market income distribution receive 450 pesos per quarter on average while those in the top first percentile receive 856 pesos.

more children. Having a more educated household head is associated with a higher chance of getting a government scholarship but lower chances of getting all other benefits. People in rural areas or Southern states have higher chances of receiving transfers from *Prospera*, non-contributory pensions,<sup>13</sup> or *Proagro*.

## 4.2 Progressivity

We now turn to the analysis of the progressivity of transfers. A transfer is considered progressive if it contributes to a reduction in inequality. We speak of “absolute” progressivity when the absolute amount of a transfer decreases with income, and of “relative” progressivity when the ratio of a given transfer to the (pre-transfer) income declines with income.<sup>14</sup> The concentration curve of a transfer depicts the proportion of that transfer received by each net market income quantile. A transfer is said to be progressive in absolute terms if its concentration curve lies everywhere above the 45-degree line, which implies a negative concentration coefficient.<sup>15</sup> A transfer is progressive in relative terms if its concentration curve lies everywhere above the net market income Lorenz curve (Lustig and Higgins, 2013). Figures 8 and 9 show the concentration curves of the five different government transfers we discussed above in 2004 and 2016. All transfers were everywhere progressive in relative terms in both years. Only *Prospera* (*Oportunidades*) was everywhere progressive in absolute terms both in 2004 and 2016. *Proagro* was progressive in absolute terms only in 2004, and so were non-contributory pensions, on which data is not available for 2004, in 2016.

Progressivity can be summarized by the Kakwani index, defined for a given transfer as the difference between the Gini coefficient for the reference net market income (NMI) minus the concentration coefficient for that transfer (Kakwani, 1977; Lustig and Higgins, 2013). A positive Kakwani index is a necessary condition for a transfer to be progressive in relative terms, while a positive and larger than the net market income Gini coefficient index is necessary, but not sufficient, for a transfer to be progressive in absolute terms. Our calculations confirm that the Kakwani index is positive for all types of transfers (since all transfers are everywhere progressive in relative terms) and above the base income Gini coefficient for transfers from *Prospera*, the non-contributory pension program for elderly adults, and *Proagro* in 2016 (Table 3). However, the index for all transfers is lower in 2016 than in 2004, suggesting a possible erosion of their progressivity, although on average, benefit amounts increased.

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<sup>13</sup>This results may reflect the fact that the non-contributory pension program was first launched in some rural areas in 2007.

<sup>14</sup>Since ENIGH collects information about after-tax income, we use “net market income,” equal to total household income minus government transfers, as the reference income.

<sup>15</sup>The concentration coefficient is defined as twice the difference between the area under the 45-degree line and the area under the concentration curve.

Table 1: Effect of various household characteristics on the probability of receiving a government transfer (2016, logit regression)

VARIABLES	(1) Prospera	(2) NC pension	(3) Proagro	(4) Scholarship	(5) Medical
indigenous	0.557*** (0.0313)	-0.0485 (0.0541)	0.214*** (0.0558)	-0.133* (0.0694)	0.103*** (0.0363)
1 adult	-0.414*** (0.0504)	-0.309*** (0.0742)	-0.709*** (0.100)	-0.103 (0.114)	-0.148*** (0.0549)
3+ adults	0.634*** (0.0360)	0.355*** (0.0653)	0.721*** (0.0631)	0.683*** (0.0703)	0.0807** (0.0395)
no child	-1.251*** (0.0448)	0.197** (0.0900)	0.399*** (0.0807)	-1.068*** (0.0955)	0.114** (0.0506)
1 child	-0.535*** (0.0456)	0.000622 (0.103)	0.141 (0.0926)	-0.253*** (0.0805)	-0.0763 (0.0554)
3+ children	0.791*** (0.0445)	-0.0792 (0.115)	0.0854 (0.0936)	-0.00856 (0.0820)	0.152*** (0.0568)
older adult	-0.124*** (0.0402)	5.722*** (0.111)	0.570*** (0.0623)	-0.306*** (0.107)	0.837*** (0.0419)
secondary education	-0.715*** (0.0345)	-0.538*** (0.0711)	-0.826*** (0.0732)	0.389*** (0.0790)	-0.175*** (0.0424)
tertiary education	-1.892*** (0.0914)	-1.051*** (0.0887)	-1.403*** (0.148)	0.577*** (0.0987)	-0.496*** (0.0610)
rural	1.297*** (0.0303)	0.750*** (0.0532)	2.059*** (0.0771)	-0.0229 (0.0684)	0.122*** (0.0365)
north	-0.313*** (0.0334)	-0.215*** (0.0512)	-0.261*** (0.0615)	-0.0265 (0.0614)	-0.0555 (0.0358)
2nd income quintile	-0.428*** (0.0427)	-0.327*** (0.0750)	-0.269*** (0.0755)	0.171 (0.117)	0.216*** (0.0528)
3rd income quintile	-0.753*** (0.0471)	-0.508*** (0.0821)	-0.505*** (0.0879)	0.377*** (0.119)	0.214*** (0.0560)
4th income quintile	-1.089*** (0.0536)	-0.583*** (0.0886)	-0.427*** (0.101)	0.430*** (0.119)	0.291*** (0.0588)
5th income quintile	-1.606*** (0.0674)	-0.951*** (0.0967)	-0.582*** (0.113)	0.376*** (0.127)	0.356*** (0.0650)
Constant	-0.790*** (0.0546)	-5.170*** (0.135)	-4.551*** (0.120)	-3.783*** (0.131)	-2.516*** (0.0680)
Observations	70,271	70,271	70,271	70,271	70,271

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Households with zero adults are dropped. The benchmark household is a household with two adults, two children and no one over 65, residing in an urban area in a Southern state, with a non-indigenous head who only had primary education.



Table 2: Effect of various household characteristics on the amount of each government transfer received (2016)

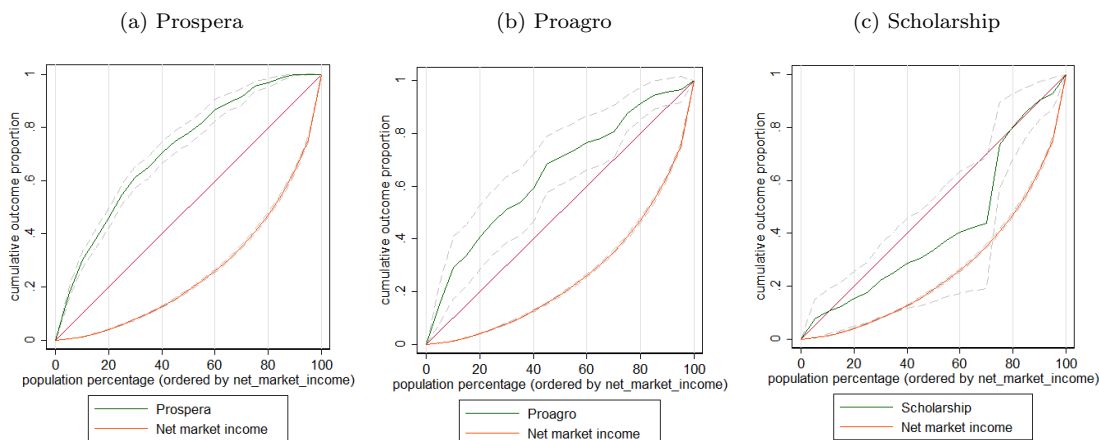
VARIABLES	(1) Prospera	(2) NC pension	(3) Proagro	(4) Scholarship	(5) Medical
indigenous	198.6*** (13.35)	-17.94** (7.870)	-16.20*** (5.299)	2.393 (25.80)	-66.56* (33.97)
1 adult	-34.44*** (12.99)	-99.24*** (10.31)	-16.99*** (4.434)	-6.554 (24.26)	58.87 (40.39)
3+ adults	221.9*** (14.56)	5.499 (9.105)	46.77*** (11.13)	55.53** (26.01)	-2.508 (56.88)
no child	-411.9*** (14.56)	55.16*** (9.111)	14.24* (7.478)	27.62 (35.55)	-10.44 (56.35)
1 child	-221.3*** (18.66)	5.621 (7.716)	9.843 (16.24)	-22.72 (30.36)	-25.32 (85.88)
3+ children	665.2*** (27.05)	-19.76*** (6.990)	-14.65** (7.103)	-19.35 (26.93)	40.71 (59.84)
older adult	-91.29*** (13.41)	1,151*** (17.97)	43.58*** (7.627)	-70.12*** (19.31)	281.4*** (56.83)
secondary education	-248.9*** (15.15)	-71.46*** (8.505)	-37.09*** (4.776)	22.51* (13.26)	-44.59 (45.52)
tertiary education	-275.2*** (16.64)	-121.8*** (12.73)	-21.03 (16.01)	168.7*** (34.89)	-244.6*** (84.01)
rural	553.5*** (16.07)	69.05*** (7.736)	173.7*** (7.505)	3.385 (15.01)	-7.901 (26.12)
north	-95.50*** (10.16)	-37.69*** (6.581)	12.91 (8.401)	-18.49 (30.01)	-106.3** (52.80)
2nd income quintile	-8.100 (18.59)	-28.59** (12.48)	5.220 (6.428)	-0.449 (7.507)	90.30*** (17.60)
3rd income quintile	-100.8*** (18.87)	-48.86*** (12.95)	0.961 (7.729)	27.23 (16.80)	175.6*** (28.01)
4th income quintile	-192.1*** (20.37)	-63.58*** (12.94)	-4.469 (10.05)	33.59 (22.50)	298.8*** (41.64)
5th income quintile	-249.2*** (19.54)	-85.51*** (15.37)	20.88* (12.42)	153.9*** (34.88)	919.5*** (124.6)
Constant	621.0*** (22.70)	110.0*** (12.73)	11.80* (7.087)	10.67 (27.39)	37.38 (51.44)
Observations	70,271	70,271	70,271	70,271	70,271
R-squared	0.201	0.387	0.011	0.005	0.002

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: Households with no adults are dropped. The benchmark household is a household with two adults, two children and no one over 65, residing in an urban area in a Southern state, with a non-indigenous head who only had primary education.

Figure 8: Concentration Curves (2004)



Note: Information on noncontributory pensions and non-monetary government transfers for medical expenses is not available for 2004.

Sources: INEGI; Authors' calculations.

Table 3: Kakwani Indices

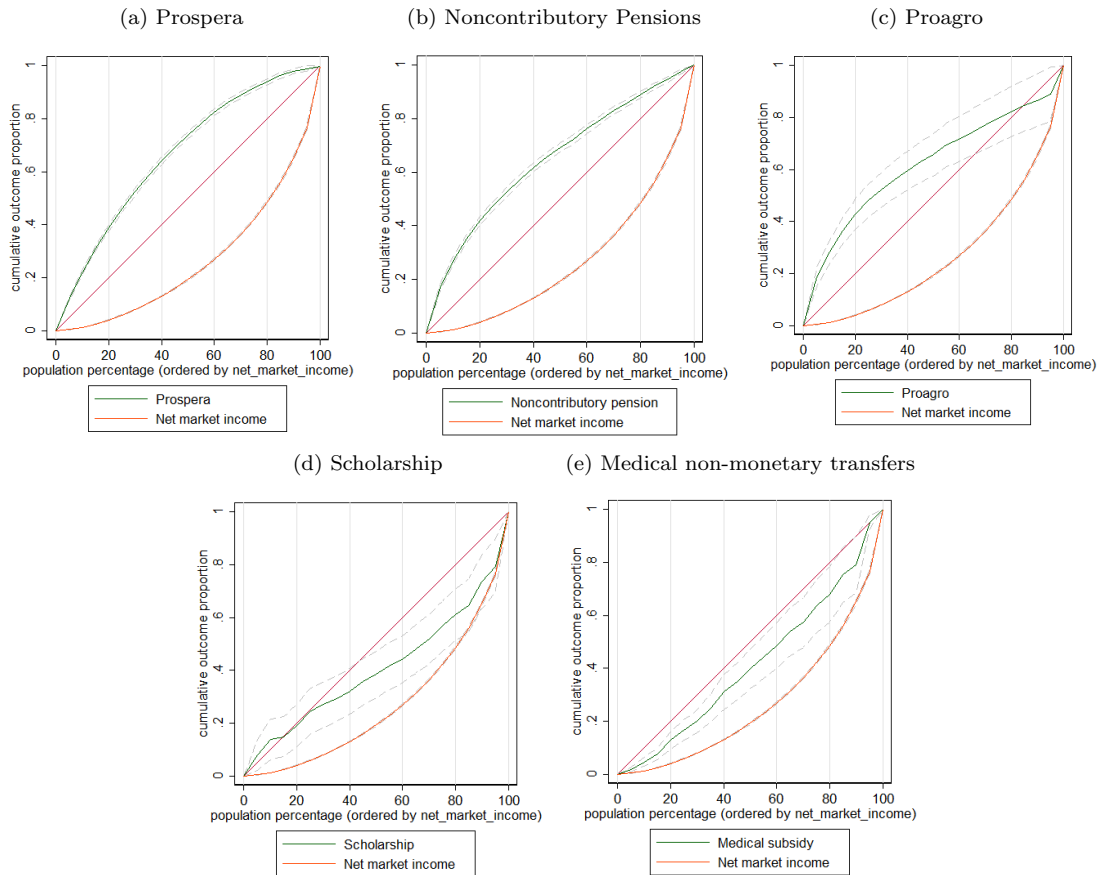
	<i>Prospera</i>	NC pensions	<i>Proagro</i>	Scholarships	Medical transfers	Memo: NMI Gini
2004	0.909	n/a	0.780	0.327	n/a	0.481
2016	0.803	0.765	0.702	0.279	0.296	0.467

### 4.3 Inequality of Opportunity

Not only do government transfers reduce income inequality in general, but they also affect the inequality of opportunity. The opportunity index summarizes how much inequality is explained by a “circumstances set”, which consists of characteristics of a household that are fixed and do not depend on the household’s effort.<sup>16</sup> Given the significant differences in average household income across states documented in the previous section and the non-negligible inequality “between” rural and urban areas, we focus on how much of the inequality in each income measure is explained by where the household lives. We therefore include in the circumstances set the state and the size of the locality where the household lives.

<sup>16</sup>See Lustig and Higgins (2013) for a description of the index and its computation: “Each individual is attributed the mean income of their circumstances set, and this income distribution is called the smoothed income distribution. Inequality measured over the smoothed income distribution for each income concept uses the mean log deviation, which gives the measure of inequality of opportunity in levels by income concept. Dividing the resulting measure by the mean log deviation for the original income distribution measures the ratio of inequality due to inequality of opportunity as opposed to inequality of effort.” The higher the index, the larger the inequality of opportunity.

Figure 9: Concentration Curves (2016)



Sources: INEGI; Authors' calculations.

Table 4 reports the opportunity indices for 2004 and 2016. There are two main take-aways from this table. First, the inequality of opportunity based on geography fell for both net market income and total income after transfers between 2004 and 2016. Second, government transfers helped to reduce the inequality of opportunity in both years. The proportion of inequality explained by unequal opportunities stemming from different geographical locations decreased from net market income to total income after transfers in 2004 and 2016, implying that transfers have an equalizing effect on *ex ante* opportunity. In 2004, *Proagro* reduced the opportunity index by 0.6 percentage points and *Prospera* by 0.3 percentage points. Government scholarships did not affect the opportunity index. In 2016, *Prospera* reduced the opportunity index by 0.6 percentage points while *Proagro* did not affect the index. Non-contributory pensions, scholarship, and non-monetary transfers for medical expenses all increased the opportunity index. Overall, the index is still lower after transfers.

Table 4: Opportunity Indices

	2004	2016
Net Market Income (NMI)	20.9%	16.5%
NMI + <i>Prospera</i>	20.6%	15.9%
NMI + Non-Contributory Pensions	n/a	17.0%
NMI + <i>Proagro</i>	20.3%	16.5%
NMI + Scholarships	20.9%	16.6%
NMI + Medical Transfers	n/a	16.6%
Total Income After Transfers	20.1%	16.2%

Note: The opportunity index measures the share of income inequality that can be explained by the circumstances set. Here the circumstances set is defined by the state and the size of the locality where the household lives.

#### 4.4 Effectiveness

While concentration curves, Kakwani indices, and the opportunity indices inform us about the effect of transfers on inequality, their overall effectiveness depends on the total transferred amounts. Lustig and Higgins (2013) define an effectiveness indicator of a government transfer as the difference between the Gini coefficient or poverty index without the transfer and that with the transfer divided by the size of the transfer as a percent of GDP. Table 5 shows the total amounts reported in ENIGH and the effectiveness indicators for the five kinds of transfers under consideration. In terms of reduction in inequality, transfers from *Prospera* have the highest effectiveness, followed by non-contributory pensions, *Proagro* subsidies, government scholarships, and government non-monetary transfers for medical expenses, respectively. The effectiveness of the last two programs is ten times smaller than that of the first three. The results for the poverty index are broadly similar, with *Prospera*, *Proagro*, and non-contributory pensions having the greatest effectiveness. Figure 10 illustrates the relative effect of *Prospera* and non-contributory pensions on the Gini coefficient and the poverty index compared to all other government transfers. Those two programs represent about half of the total government transfers received by an average household, but account for 73 percent of the decline in the Gini coefficient coming from government transfers, and two thirds of the decline in the poverty index from transfers. The Gini coefficient and the poverty index could theoretically further drop by respectively 2.6 and 5.6 percent if the amounts currently allocated to *Proagro*, government scholarships, and non-monetary medical transfers were to be distributed in the same way as *Prospera* and non-contributory pensions.<sup>17</sup>

<sup>17</sup>This calculation is for illustrative purposes only and solely considers the mathematical effect of transfer amounts on poverty and income inequality.

Table 5: Effectiveness of each government transfer type in 2016 (transfer amount in billions of pesos per quarter)

	<i>Prospera</i>	NC pensions	<i>Proagro</i>	Scholarships	Medical	All transfers
Total transfer amount	15.47	8.44	2.07	3.46	9.35	48.50
Mean share of total income (%)	2.8	1.7	0.3	0.2	0.6	6.8
Effectiveness (Gini)	2.67	2.50	2.14	0.24	0.17	1.74
Effectiveness (poverty)	5.14	4.46	4.56	1.32	1.58	3.64

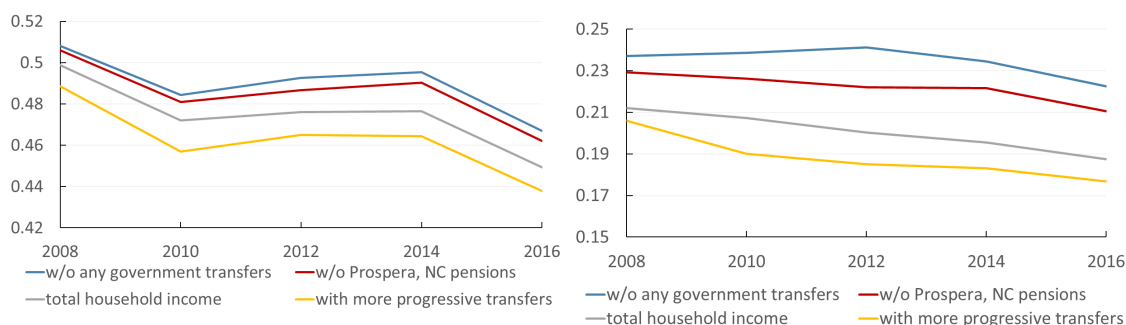
Note 1: The transfer amounts for the five types of government transfers identified separately do not add up to the amount for all government transfers because there are other types of small government transfers not listed. They still represent more than 80 percent of the total reported transfers.

Note 2: The poverty cutoff is 50 percent of the median total household income.

Sources: WEO; INEGI; Authors' calculations.

Figure 10: Effects of transfers on inequality and poverty (2008-2016)

(a) Gini coefficient with and without government transfers (b) Poverty index with and without government transfers



Note: “With more progressive transfers” refer to the hypothetical index if all government transfers were as progressively distributed as *Prospera* and non-contributory pensions.

Sources: INEGI; Authors' calculations.

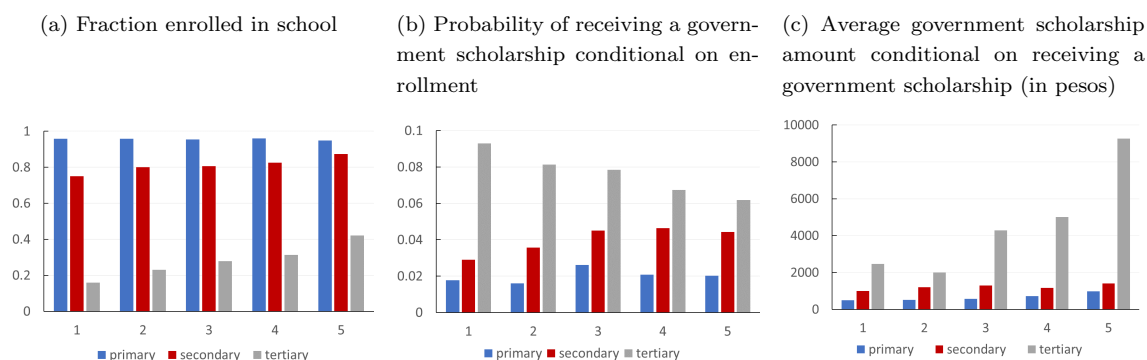
## 5 Government scholarships and medical transfers

This previous section showed that among all government transfers, government scholarships and non-monetary medical transfers had a more limited impact on poverty and inequality. This section analyzes the reasons for this result by discussing the coverage and the determinants of those transfers.

In order to investigate why government scholarships are less progressive than other programs, we analyze how enrollment, government scholarship receipt conditional on enrollment, and the amount received differ across household income quintiles (Figure 11). For primary education, enrollment is even across income quintiles while the average scholarship

amount increases with income. However, since that amount is substantially lower than the average scholarship for other levels of education, scholarships for primary education have a limited effect on the overall progressivity of government scholarships. For secondary education, both enrollment and the probability of receiving a government scholarship increase with income, while the scholarship amount is more or less even across income quintiles. For tertiary education, enrollment increases with income, the probability of receiving a government scholarship conditional on enrollment decreases with income, but the average amount conditional on receiving a government scholarship increases sharply with income. Such a result could be expected in the case of merit-based scholarships if students from wealthier backgrounds attend more expensive schools. In sum, children from poor households are less likely to enroll in secondary or tertiary education; they are also less likely to receive a government scholarship for secondary education; and they tend to receive smaller scholarships for tertiary education. These three facts contribute to making government scholarships less progressive.

Figure 11: Scholarship by household income quintile (2016)



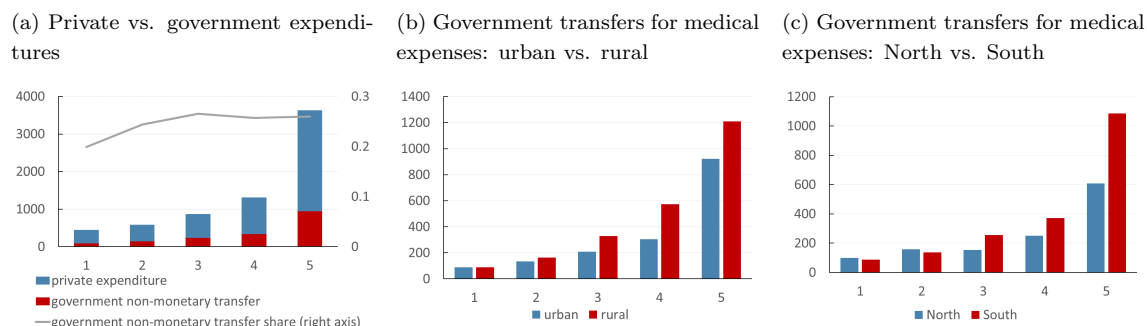
Sources: INEGI; Authors' calculations.

Non-monetary transfers for medical expenses increase with income. Households in the bottom income quintile receive about 50 pesos per quarter while those in the top quintile receive about 800 pesos per quarter. This difference may be due to a larger consumption of medical services by wealthier households. Indeed, summing up the medical expenses covered by government transfers and out-of-pocket medical spending, households at the bottom income quintile spend about 500 pesos per quarter for medical services while those at the top quintile spend a little more than 3500 pesos per quarter. However, the share of expenses covered by government transfers also increases with income. This suggests that there is a significant room for improving the progressivity of medical subsidies.

To investigate whether lower income households are not receiving medical subsidies because they live in regions with poor access to hospitals, we looked at how the transfer

amounts varied between urban and rural households and between the North and the South. Figure 12b shows that households from rural areas actually receive more medical subsidies than their urban counterparts, in particular for households at the top of the income distribution, which is consistent with a lower progressivity of medical transfers but contradicts the hypothesis that subsidies are lower in rural regions. Similarly, transfers for medical expenses are higher for Southern households than for Northern households in the top three quintiles of the income distribution. One possible explanation is that healthcare facilities that are associated with *Seguro Popular*, the government funded free health insurance program, may be scarcer in rural and Southern area (Knox, 2018).

Figure 12: Medical expenses by household income quintile (2016, in pesos)



Sources: INEGI; Authors' calculations.

## 6 Conclusion

Government transfers have played a key role in alleviating poverty and containing income inequalities in Mexico. They have also allowed for a reduction in inequality of opportunity. All transfers analyzed in this paper were found to be progressive in relative terms, but *Prospera* and the non-contributory pension program for elderly adults are the most effective programs at reducing inequality, notably because they target households at the bottom of the income distribution. In contrast, the government scholarships and non-monetary medical transfers increase with income, possibly reflecting differences in access to tertiary education and medical services.

The analysis does not account for the dynamic changes that may be induced by social policies. For instance, transfers supporting tertiary education which benefit students from wealthier backgrounds more than those from poorer backgrounds may end up aggravating income inequality in the future. Non-contributory pensions, while helpful to reduce old-age poverty and inequality in the short term, could also discourage formal employment and pension contributions in the long-term, thereby perpetuating a certain level of income inequality. The analysis of such dynamic effects is left for future research.

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