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## **TITLE PAGE**

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**Abstract:** Given the limited financing capacity of developing countries, conditional cash transfers (CCT) programs form an affordable solution to provide a social safety net to vulnerable households. However, compliance with conditionalities may limit participation and increase dropouts, particularly when compliance-related constraints are high and cash incentives are relatively low. Based on Mexico, a developing country that has gradually expanded a CCT program from rural to urban areas, this study empirically analyses the effects of the amount of cash transfers on the staying/leaving probability of household participants. Using household longitudinal surveys, we find that the poorest households have the highest probability of leaving the program. Interestingly, the level of cash transfers increases this probability for the poorest participants compared to the richest ones. We conclude that the program does not manage to maintain the poorest households in the program because the level of cash incentives is too low in urban settings.

**Keywords:** Mexico; social protection; conditional cash transfers; exit rates; targeting strategy; exclusion errors.

**JEL codes:** O15; I32; H23

## I. INTRODUCTION

In developing countries, often over-indebted, the introduction of a social protection system is limited by budgetary and fiscal restrictions. Many emerging countries like Mexico have thus opted for a compromise alternative: conditional cash transfers (CCT) programs. Since these programs only target the poorest, their cost is relatively low. The principle is simple. In exchange for monetary (or non-monetary) supplements, the participant agrees to meet a number of conditions (called conditionalities), which generally aim to increase public service demand (i.e. school and health center). Cash transfers are said to be “conditional” because participants who do not meet the attached conditionalities are directly excluded from the program and do not receive payments anymore. Cash incentives have two main functions: (i) to encourage eligible households to take part into the program and (ii) to offset several constraints related to public service attendance, such as direct (registration, uniform, equipment, consultation, transportation, medicine, injections, etc.) and indirect costs (opportunity cost, loss of time, etc.). Note that the poor are particularly sensitive to these constraints. Evidently, other factors limit the public service demand from poor populations, such as the lack of interest in health and education. This lack of interest is theoretically attributable to a low level of nutritional and health knowledge, as well as temporal inconsistencies (preference for a current satisfaction rather than for an uncertain future investment in human capital, Banerjee and Duflo, 2011).

The Mexican CCT program, called *Progresa*, then *Oportunidades*, and finally *Prospera*, is one of the most ambitious and successful around the world (Fiszbein et al., 2009). Initially, the purpose of the program was to eradicate hunger and extreme poverty by intervening in education, nutritional deficiencies and infectious diseases. Established in 1997 as part of a randomized controlled trial in a small group of marginalized rural areas, this program has shown positive impacts on human capital indicators. In view of its conclusive results, the government extended the project to overall marginalized rural areas between 1998 and 2000, and then to small urban areas in 2001 and to Mexican metropolises in 2002. In 2007, poor households from all marginalized communities of the country (rural and urban) were eligible for the program.

Despite its success in rural Mexico in terms of education, health and nutrition, especially for children (Hoddinott and Bassett, 2008), the existing literature reveals that the program expansion to urban areas, since 2001, has several limitations. Indeed, the participation rate of eligible households (or take up rate) is anecdotic in cities (around 50%). According to Angelucci, Attanasio and Maro (2012) and Behrman et al. (2012), several reasons explain the high level of exclusion errors in urban areas. First, the selection process of participants based on self-selection has led to various involuntary exclusions: almost 20% of potentially eligible urban households have not been informed of the existence of the program. Furthermore, Behrman et al. (2012) denote that more than 30% of eligible urban households have voluntarily chosen not to enroll (i.e. self-exclusion). In addition, the annual exit rate, mainly due to conditionalities violations, exceeds 7% in urban areas, compared to 3% in rural areas. Surprisingly, in opposition to the self-targeting theory, these exits are particularly common for the poorest urban households (González-Flores, Heracleous and Winters, 2012). In line with the take-up theory, the eligible households would make a rational arbitrage between the gains and the

costs induced by program enrollment. Therefore, besides the lack of knowledge about the program existence and eligibility criteria, the imbalance between cash incentives and the cost of living in cities might explain the low take-up capacities of the program to enroll (and held in place) the poorest eligible urban households. Indeed, the amounts of cash transfers are the same in rural and urban areas, although living standards are significantly different (Angelucci and Attanasio, 2009). Therefore, cash incentives would be too low to take-up a substantial part of eligible households and offset conditionality-related constraints (direct and indirect costs, preference for current satisfactions, etc.). Curiously, no study empirically analyzes the role of cash transfers in enrollment and exit rates. Yet the amounts of monetary incentives are an adjustment variable that can more than proportionally improve both rates (Attanasio, Meghir and Schady, 2010).

Using a quantitative design based on panel data from the *Mexican Family Life Survey* (MxFLS), the present study seeks to better understand the determinants of the low take-up rate that characterizes the urban version of the Mexican CCT program. More particularly, it is the first study that assesses the direct influence of cash incentives on the leaving risks by taking into account a large spectrum of take-up determinants. Note that the identification of the leaving determinants will be useful for the program administrators in order to minimize the exclusion errors. Indeed, recall that exclusion errors are particularly high in cities and that three-quarters of the program exits are due to a noncompliance of health- and nutrition-related conditionalities and other irregularities (González-Flores, Heracleous and Winters, 2012).

We structure the rest of the article as follows: Section 2 succinctly describes the Mexican program of CCT; Section 3 presents the existing literature that analyzes the low take-up rate of the program in the urban context; Section 4 describes the data and establishes the empirical strategy; Section 5 comments the results; Section 6 concludes.

## **II. DESCRIPTION OF THE MEXICAN CONDITIONAL CASH TRANSFERS (CCT) PROGRAM**

### **2.1. Benefits**

The Mexican program offers two types of cash transfers: (i) a basic aid to increase household food consumption; (ii) optional scholarship to encourage school attendance. Each type of transfer is linked to specific conditionalities.

In exchange for the basic food aid (the same amount to all participants), each household member must visit the nearest health center every two months for medical checkups. It is also asked to the person receiving the transfers (generally the mother) to attend monthly public health training and health/nutritional prevention meetings (*pláticas*). Every month, health centers report attendance to program administrators. Households that have not complied with these conditionalities for four consecutive months (or six non-consecutive months in one year long) are automatically excluded from the whole program's benefits.

Concerning scholarships, the amount of transfers varies by household since it depends on the number of schooled children, the attended school section and gender (see Table A.1 in the Appendix). Note that the program sets a maximum transfer threshold (20% of household expenditure) to avoid possible natalistic

externalities (Skoufias, 2005). To benefit from a whole scholarship, a student must enroll in a school (approved by the Ministry of Education) and be present at least 85% of the month. Registration and attendance are reported by the school authority and relayed to program administrators. If school attendance is lower than 85%, a proportional amount is deducted from the bi-monthly total payment. For example, if a student is absent 50% of the time in the last two months, he will receive half of scholarships.

To conclude, unlike the basic food transfer, scholarship-related conditionalities do not necessarily lead to definitive exclusions, but rather to payment reductions (Álvarez, Devoto and Winters, 2008). It means that a household can partially enroll in the program as long as the health and nutrition component is met. However, if a household does not comply with the health and nutrition component, but continues to send its children to school, thus this household will be permanently excluded from the whole program's benefits.

## **2.2. Selection process of beneficiaries**

In the Mexican CCT program, the beneficiary targeting strategy follows a dual selection process. As a first step, a geographical selection of the poorest communities is established. Since the level of concentration of poor households is very different between rural and urban areas, the geographic selection process is region-specific (Orozco and Hubert, 2005). Then, a selection of eligible households is carried out within pre-selected rural communities and urban segments. In other words, only poor households belonging to a poor community are eligible for the program.

In eligible enclaved communities, interviewers go directly at home. Hence, a quasi-exhaustive census of the inhabitants is conducted in rural areas. Households meeting the eligibility criteria are *de facto* invited to enroll. However, for cost reasons, this type of census is not carried out within eligible urban segments. Instead, a self-selection system is installed. First, households living in eligible urban segments are informed about the existence of the program through mobile loudspeakers, advertisements and radio messages. Households, perceiving themselves as eligible, must go to the nearest temporary reception desk (installed in a health center) where they are interviewed as part of the ENCASURB survey (*Encuesta de Características Socioeconómicas de los Hogares Urbanos*). The information is directly entered by computer and simultaneously juxtaposed with the multivariate poverty index (homogeneous at the national level since 2001) called *puntaje* (see Skoufias, Davis and de la Vega, 2001). Finally, for households meeting the eligibility criteria (having a *puntaje* higher than 0.69), home visits are then completed to check the veracity of the data recorded during the interview. Afterwards, the program administration implements a recertification process every three years to limit inclusion errors. During the recertification, the *puntaje* is reassessed with uploaded household information. Households with a *puntaje* higher than 0.383 remain whole beneficiaries, households with a *puntaje* lower than 0.077 are definitely excluded and households with a *puntaje* between 0.077 and 0.383 are transferred to a reduced version of the program (called *Esquema Diferenciado de Apoyo - EDA*) for three additional years before being definitely excluded. Households transferred in the EDA continue to benefit from nutritional supplements, the basic health package and scholarships for secondary students.

This system of self-selection has resulted in the exclusion of many eligible urban households. Angelucci, Attanasio and Maro (2012) estimate that about 50% of potentially eligible urban households do not benefit from the program, while this rate is lower than 10% for rural households. Behrman et al. (2012) report that almost one-third of them did not know about the existence of the program. In other words, more than two-thirds of eligible non-participants voluntarily decided not to enroll in the program whereas they could. Although some eligible households have probably felt uncertainty about their eligibility, many have voluntarily decided to self-exclude, probably because program payments are insufficiently attractive compared to urban living standards (Angelucci and Attanasio, 2009). Recall that the amounts of cash supplements are identical in rural and urban areas, despite an evident gap in living costs.

### III. LITERATURE SURVEY

As discussed in the literature, the exit rate is much higher in urban areas than in rural areas. While the annual exit rate reaches 3% in rural settings, this rate exceeds 7% in cities. Hence, the total exit rate between 2002 and 2007 is about 43% in urban areas against only 16% in rural settings (Álvarez, Devoto and Winters, 2008). González-Flores, Heracleous and Winters (2012) estimate that three-quarters of these exits are "voluntary": i.e. due to a noncompliance of the health- and nutrition-related conditionalities (56%), as well as other irregularities (18%). Consequently, only one-quarter of program exits are attributable to the three-year recertification process (20%) and counter-visits (6%) that the program administration implements to reduce inclusion errors.

According to the self-targeting theory, the relationship between the socio-economic status and the exit probability should be positive and linear. Indeed, the constraints related to conditionalities compliance would act as a self-regulation mechanism (González-Flores, Heracleous and Winters, 2012). It means that the least poor households should self-exclude themselves from the program, given a relatively high opportunity cost and the existence of better alternatives (better skills, higher migration opportunities, etc.). However, empirical findings from González-Flores, Heracleous and Winters (2012) reject the self-targeting hypothesis in the Mexican urban context. Based on administration data, these authors emphasize a U-shaped relationship between the *puntaje* (poverty index) and the dropout probability. In addition, the most vulnerable participants (e.g. single-parent families) have the highest exit probability. This last result suggests that the direct and indirect costs related to fulfilling commitments, as well as the poor understanding of the program and its interests, significantly limit the sustainable involvement of the poorest households. Heracleous, González and Winters (2016) add that half of urban participants voluntarily choose not to benefit from whole scholarships, failing to meet attendance requirements. This voluntary noncompliance to the educational component is particularly strong for the poorest households and mainly concerns high school scholarships. This result highlights the fact that the opportunity cost of an adolescent to study, rather than working, is much higher in cities than in rural areas. According to Schultz (2004), scholarships provided by the program represent between one-half and one-third of a full-time wage in Mexican cities.

González-Flores, Heracleous and Winters (2012) report that the exit probability is positively correlated with the size of the city. For these authors, this result is partly due to the dense traffic that characterizes large Mexican cities, increasing the costs of direct transportation (travel prices) and opportunities (time spent in transportation). Moreover, as living standards theoretically increase with the size of the city, the purchasing power that offers cash transfers (similar in all areas) probably decreases with the size of the city. In other words, in large cities, cash incentives could not offset the direct and indirect costs related to conditionalities compliance. Finally, González-Flores, Heracleous and Winters (2012) observe that the exit probability is negatively correlated with the level of neighborhood marginalization (percentage of poor households in the neighborhood). The authors comment on this finding using the network theory. Since the density of participants is low in the least marginalized neighborhoods, the probability of obtaining information about the program is likely to be low in such communities.

#### IV. DATA AND EMPIRICAL STRATEGY

The data used in this study come from the *Mexican Family Life Survey* (MxFLS), the first survey with a representative sample of the Mexican population at national, rural-urban and regional levels. Sampling directives were drawn up by the Mexican Institute of Statistics. The survey covers a 10-year long period with three distinct waves. The first wave was carried out in 2002 with 35,677 individuals surveyed in 8,440 households (living in 150 municipalities across 16 Mexican states). Given the longitudinal dimension of the survey, the second (2005-06) and the third (2009-12) waves are based on the initial sample from 2002. For both waves, the follow-up rate of the initial sample exceeds 90% at the household level. The MxFLS includes data on program enrollment and the amount of cash transfers yearly received by the participants, as well as detailed information on socioeconomic and demographic characteristics of households and individuals.

The main motivation of this study is to empirically assess the influence of cash incentives on the program exit probability in urban Mexico. Consequently, only urban households that enroll and receive cash transfers in 2005 are examined. Then, we distinguish stayers from leavers using treatment status information from the 2012 survey. Since the MxFLS is representative at the rural-urban level, the households in the urban sample are assumed representative of enrolled households in urban Mexico. The reduced-form model based on urban participants takes the form of a Probit-type binomial regression:

$$P(\text{Stayer}_j) = \alpha + \beta_1 X_j + \beta_2 \text{cash}_j + \varepsilon_j \quad [1]$$

Where  $P(\text{Stayer}_j)$  is the probability, for a household  $j$ , of staying as a participant between 2005 and 2012, rather than leaving the program between both periods.  $X_j$  is a vector of control variables measured in 2005 that includes socioeconomic and demographic characteristics of the household head (age, gender, annual labor income, marital status, education and socio-professional status) and the whole household (number of children by age groups, percent of female children, demographic dependency index and owned assets). The vector  $X_j$  also includes a community factor enabling to capture the size of cities and their level of urban development in

2005 (a composite index measuring the availability of infrastructural assets in the municipality). Finally,  $cash_j$  is the amount of transfers (in pesos) that the household received in 2005. In theory, households that received the most cash are those who enroll a longer time in the program and/or who accumulate more children scholarships (by having older and/or female schooled children, see Table A.1 in the Appendix). It is the reason why we control for the number of children by age groups and the percent of female children within each enrolled household. Note that we analyze the cash transfers variable through two different approaches: linearly using a logarithmic transformation of annual cash payments and nonlinearly using a quartile categorization of the distribution. Outlier values are excluded according to reasonable thresholds of transfers based on the estimated values of Table A.1 in the Appendix. A description of the variables used in the model is available in Table A.2 in the Appendix.

The purpose of Equation 1 is to test the following hypotheses:

- *H1 (self-targeting hypothesis): For enrolled households, if the relationship between socioeconomic status and the probability of staying in the program is negative and linear, it means that the least poor household self-exclude themselves from the program, given a relatively high opportunity cost and the existence of better alternatives. In such a case, the self-targeting hypothesis is accepted and the efficiency of the program is thus limited by inclusion errors. Otherwise (a U-inverted or a positive relationship between socioeconomic status and the staying probability), the self-targeting hypothesis is rejected and the efficiency of the program is thus limited by exclusion errors.*
- *H2 (hypothesis of a lack of cash incentives): If cash transfers do not manage to maintain the poorest households in the program (who theoretically are not concerned by self-targeting and recertification processes), one could assume that monetary supplements do not offset the constraints associated with conditionalities compliance. To test this latter hypothesis, an interaction term is included in an alternative specification of Equation 1: the amount of transfers is crossed with the household head's income quartiles.*

To be clear and transparent, the robustness of the empirical model against endogeneity problems must be seriously discussed. Obviously, the temporality gap between the regressors and the outcome indicator dismisses the potential presence of reverse causality in the model. Indeed, it is impossible that being a stayer or a leaver in 2012 affects the amount of cash payments in 2005 or the socioeconomic status in 2005. However, the omission of factors simultaneously correlated with the regressors and the unexplained variance of the probability of staying enrolled ( $\varepsilon_j$ ) could bias the Probit estimations (Equation 1). For example, the level of interest in education and health by the household members, as well as their cognitive skills, are assumed to be positively and simultaneously correlated with the household's socioeconomic status (included in  $X_j$ ), the accumulated amount of scholarships (included in cash payments,  $cash_j$ ) and the degree of program involvement and understanding (and thus with  $P(Stayer_j)$ ). Intuitively, such an omission might overestimate the positive relationship between socioeconomic status and the probability of staying in the program and thus

erroneously lead to rejecting the self-targeting hypothesis (*H1*). Regarding *H2*, these omitted factors might also overestimate the positive relationship between cash transfers and the staying probability. Unfortunately, these intuitions are only partially testable since such factors are often unobserved. However, we attempt to capture these undesirable biases by including the highest cognitive skills score obtained by the adult household members in an alternative specification of Equation 1.<sup>1</sup> Furthermore, as mentioned earlier, we take the number of children by age groups into consideration in order to limit endogeneity biases. The omission of this factor could have underestimated the positive effect of cash incentives on the probability of staying enrolled in the program (*H2*). Indeed, households with older children potentially received more scholarships in 2005 (see Table A.1) and then have a higher exit probability during a recertification process due to the potential emancipation of their children (i.e. the *puntaje* is calculated using the number of young children).

Another possible limitation of this study concerns the attrition of panel data between 2005 and 2012. Nonetheless, there is no reason to think that a major part of households which left the survey (e.g. due to a migration) would also leave the program if they would stay in the survey. Moreover, the potential leavers which left the survey are likely to have the same characteristics than the leavers which have remained in the survey. Therefore, we consider that the panel attrition is not correlated with the probability of leaving the program and thus does not affect the results.

## V. RESULTS

### 5.1. Descriptive statistics

As expected, the participation rate of households in the program (based on the total samples) is significantly higher in rural areas than in urban communities (Table 1). While about one quarter of rural households enroll in the program over the period 2002-2012, the participation rate of urban households increased from 3% in 2002 to 6% in 2012. Note that this increase is probably related to the gradual expansion of the program. While the participation rate in large cities (more than 100,000 inhabitants) tripled between 2002 and 2012, this rate only doubled in medium-sized cities (between 15,000 and 100,000 inhabitants) and increased by only 40% in small towns (between 2,500 and 15,000 inhabitants). In addition, it is interesting to note that the participation rate decreases when the size of the city increases. In line with González-Flores, Heracleous and Winters (2012), we conclude that the program is having difficulty settling in major urban centers.

**Table 1: Households' participation rates based on the total samples**

	2002		2005-06		2009-12	
	N	Treated	N	Treated	N	Treated
<b>Urban areas</b>	10,616	3%	10,598	4%	10,446	6%
<i>higher than 100,000 inhbt</i>	6,812	1%	6,639	2%	6,475	3%
<i>between 15,000 and 100,000 inhbt</i>	1,863	3%	1,849	5%	1,866	6%
<i>between 2,500 and 15,000 inhbt</i>	1,941	9%	2,110	10%	2,105	13%
<b>Rural areas</b>	7,834	25%	7,969	26%	8,304	26%
<b>Rural vs. Urban mean-comparison test</b>		22%		22%		20%
<b>(p-value)</b>		(0.000)		(0.000)		(0,000)

<sup>1</sup> We do not include cognitive skills score into the main model due to the low number of observations for this variable.

Source: MxFLS (2002-2012).

Table 2 shows that the exit rates from the program are significantly higher in cities than in rural areas. Firstly, one could conclude that this large gap is due to a lower prevalence of poverty in urban areas than rural ones. Nonetheless, several elements suggest that this large gap might also be explained by the fact that urban cash incentives do not offset the constraints associated with conditionalities compliance. Indeed, the living costs significantly differ between rural and urban areas (see for example Table A.3 in the Appendix).

**Table 2: Households' exit rates in 2005-06 and 2009-12**

	Enrolled in 2002		Enrolled in 2005-06	
	N	Exit rate in 2005-06	N	Exit rate in 2009-12
<b>Urban areas</b>	269	64%	401	55%
<i>higher than 100,000 inhbs</i>	49	82%	119	64%
<i>between 15,000 and 100,000 inhbs</i>	46	67%	83	59%
<i>between 2,500 and 15,000 inhbs</i>	174	57%	199	47%
<b>Rural areas</b>	1,769	49%	1,858	45%
<b>Rural vs. Urban mean-comparison test (p-value)</b>		15% (0.000)		9% (0.000)

Source: MxFLS (2002-2012).

In contrast, Table 3 indicates no significant payments gap between rural and urban areas in 2005. In addition, the distribution of cash transfers is similar in both areas (Figure A.1 in the Appendix) and the household head's socioeconomic status does not substantially affect the amount of cash incentives (Table A.4 in the Appendix). The absence of correlations between socioeconomic status and cash transfers shows that the amount of payments is not proportional to the level of poverty: each beneficiary has the same payment rights. It also suggests that there is no significant corruption within the program. There is no a little group of richer participants who concentrates a large part of cash payments.

**Table 3: Annual cash transfers received by households in 2005-06 (in pesos)**

	N	Mean	Quartile 1	Median	Quartile 3
Urban areas	155	3,299	1,500	2,040	4,800
Rural areas	662	3,286	1,800	2,040	4,200
<b>Rural vs. Urban mean-comparison test (p-value)</b>		12.23 (0.9596)			

Source: MxFLS (2005).

## 5.2. Determinants of program dropouts

Since our main objective is to analyze the influence of cash payments on the staying/leaving probability, only households that were enrolled in the program during the 2005-06 survey are analyzed. Then, we identify stayers and leavers using treatment status information from the 2012 survey. A Probit regression estimates the relationship between annual cash transfers received a year before the 2005-06 survey and the probability of staying in the program rather than leaving between 2005-06 and 2009-12 (Table 4). We control for the presence of heterogeneity between stayers and leavers by using a comprehensive set of control variables, collected during the 2005-06 survey. As discussed earlier, these control variables partially deal with the assumed endogeneity problems. These covariates include characteristics at the household head level, at the household level and at the municipality level. Standard errors are clustered at the municipality level to correct for a potential intra-community correlation, such as specific enrollment facilities. Note that the number of observations is relatively low given the weak participation rate in Mexican cities: there are 98 enrolled households in the urban sample. However, the quality of Probit estimates are suitable: pseudo R2 are high (between 45 and 58%).<sup>2</sup> Despite a low number of observations, the standard errors are not high and various explicative variables are significant. This latter fact is not surprising insofar as all enrolled households have characteristics relatively homogeneous. Indeed, both stayers and leavers are poor households.

Columns 1 and 2 of Table 4 present the results from Equation 1. Marginal effects of control variables are consistent with the results from González-Flores, Heracleous and Winters (2012). For instance, the infrastructural development of urban municipalities tends to increase the exit probability. It is likely that the participant's concentration in the most marginalized communities leads to a better dissemination and understanding of the program. Moreover, as expected, having several young and middle age children in the household significantly increases the probability of staying enrolled between 2005/06 and 2009/12. Curiously, the percent of female children has no impacts on the probability of staying. One could have expected that households with several scholarship female children would be more interested in staying enrolled insofar as the level of scholarships is higher for women than men (see Table A.1 in the Appendix). In terms of household head's characteristics, our results enrich the findings from González-Flores, Heracleous and Winters (2012). Indeed, when the household head is a woman, in a couple and older, the probability of staying significantly increases. By contrast, households where the head belongs to a low occupational category (inactive, unoccupied or unpaid) have a higher exit risk. Concerning the household head's labor income, the 75% the richest have a higher probability of staying in the program than the 25% the poorest. Note that the probability of staying is particularly strong for Quartile 2, compared to Quartile 1 (between 67 and 69 percentage points

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<sup>2</sup> By running linear regressions of Equation (based on a linear least squares estimator), we observe that R2 have similar values as pseudo R2 (not shown). It means that the variance of the selected regressors explains about 45-60% of the variance of the probability of staying. Note that the highest R2 and pseudo R2 are found in the specification that includes the highest cognitive skills score obtained by adult household members (Column 3 of Table 4).

higher). This non-linearity is widely discussed by González-Flores, Heracleous and Winters (2012) who observe a U-shaped relationship between the poverty index (i.e. the *puntaje*) and the risk of leaving the program in urban areas. To sum up, in accordance with the seminal works of González-Flores, Heracleous and Winters (2012), our results highlight the program's difficulties in raising the awareness of the most vulnerable participants (inactive, unemployed, poor, etc.) and encouraging them to sustainably enroll in the program.<sup>3</sup> Since the poorest participants exhibit a particularly high exit probability, we can reject the self-targeting hypothesis (*H1* rejected).

**Table 4: Determinants of the probability of staying vs. leaving in urban areas, average marginal effects**

	(1)	(2)	(3)	(4)	(5)
Age of the household head (HH)	0.0385*** (2.980)	0.0352*** (3.011)	0.111*** (3.481)	0.0430*** (5.416)	0.0468*** (4.520)
Sex of the HH (male)	-0.692*** (-3.396)	-0.713*** (-3.725)	-0.955*** (-3.333)	-0.515* (-1.804)	-0.689*** (-4.078)
Marital status of the HH (in a couple)	0.625*** (3.880)	0.597*** (4.096)	0.797*** (3.246)	0.582*** (3.415)	0.621*** (3.945)
Number of young children (0-5 y.o)	0.161* (1.872)	0.171* (1.946)	0.469*** (2.834)	0.0486 (0.527)	0.146* (1.768)
Number of middle age children (6-12 y.o)	0.260*** (2.718)	0.260** (2.490)	0.501*** (3.529)	0.226** (2.406)	0.372*** (2.913)
Number of teenagers (13-15 y.o)	-0.0152 (-0.146)	0.0150 (0.132)	0.0357 (0.253)	-0.0365 (-0.376)	-0.0684 (-0.522)
Percent of female children (0-15 y.o)	-0.00126 (-0.629)	-0.00117 (-0.553)	-0.000330 (-0.116)	0.000760 (0.348)	-0.00119 (-0.494)
Demographic dependency ratio	-0.138 (-1.461)	-0.140 (-1.099)	-0.791*** (-3.005)	-0.0168 (-0.137)	-0.0573 (-0.465)
The HH has no education	0.132 (0.787)	0.125 (0.809)	-0.180 (-0.768)	0.0340 (0.216)	0.275 (1.507)
Highest cognitive skills score obtained by household adult members			-0.00891* (-1.742)		
Informal salaried worker (HH) <sup>a</sup>	0.401** (2.512)	0.398** (2.448)	0.592** (2.391)	0.388* (1.713)	0.654*** (3.290)
Formal salaried worker (HH) <sup>a</sup>	0.472* (1.777)	0.507* (1.838)	0.749*** (3.329)	0.565** (2.032)	0.589** (2.324)
Self-employed worker (HH) <sup>a</sup>	0.503*** (3.940)	0.545*** (4.078)	0.763*** (3.199)	0.577*** (3.080)	0.756*** (4.303)
Labor income of the HH-Q1					1.000*** (3.247)
Labor income of the HH-Q2	0.691** (2.482)	0.673** (2.117)	0.980*** (3.192)	-1.000*** (-2.582)	
Labor income of the HH-Q3	0.457 (1.633)	0.394 (1.274)	0.902*** (2.814)	-0.989** (-2.534)	
Labor income of the HH-Q4	0.521* (1.708)	0.465 (1.362)	0.948*** (3.094)	-0.997** (-2.252)	
Owned assets index	-1.017*** (-3.229)	-1.020*** (-3.112)	-1.319*** (-3.406)	-0.859*** (-3.478)	-1.501*** (-3.456)
Square of owned assets index	0.159*** (3.689)	0.157*** (3.554)	0.197*** (3.478)	0.141*** (3.799)	0.222*** (3.475)
Infrastructural development index	-0.210*** (-3.374)	-0.221*** (-3.665)	-0.295** (-2.303)	-0.164** (-2.418)	-0.188** (-2.144)
log(transfers)	0.228*** (3.049)			-0.479*** (-2.711)	0.513*** (3.276)
Transfers-Q2 (1,500-2,040 pesos/year)		0.247	0.722**		

<sup>3</sup> However, Table 4 shows that households with the fewest and the most assets have a higher probability of staying compared to households with an intermediate number of assets. This U-shaped relationship between owned assets and the probability of staying does not converge with our assumptions. Nevertheless, in terms of proportion, very few households are at the left-extremity of the assets distribution: only 7% of households own between 0 and 2 assets (results available on request). Therefore, this U-shaped relationship might be carried by the presence of extreme cases.

	(1.157)	(2.136)			
Transfers-Q3 (2,040-4,800 pesos/year)	0.127	0.256			
	(0.633)	(1.097)			
Transfers-Q4 (>4,800 pesos/year)	0.548***	0.799***			
	(3.905)	(4.955)			
log(transfers)*IncomeQ1					-1.107***
					(-3.660)
log(transfers)*IncomeQ2				0.856***	
				(2.937)	
log(transfers)*IncomeQ3				0.748***	
				(2.906)	
log(transfers)*IncomeQ4				0.639**	
				(2.519)	
Observations	98	98	89	98	98
Pseudo-R <sup>2</sup>	44.84	46.91	58.37	47.70	54.42

Notes: (1) Cluster robust z-statistics (at the municipality level) are in brackets: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

(2) <sup>a</sup>reference group= inactive, unoccupied and unpaid household head.

Source: *MxFLS (2005-2012)*.

In Column 1 of Table 4, the variable of annual cash transfers is expressed in a linear and logarithmic form. We find that the amount of payments increases the probability of staying in the program (significant at the 1% level). An extra unit of log-transfers raises the probability of staying in the program by 23 percentage points. In Column 2 of Table 4, when the amount of transfers is expressed in quartile categories, we note that households who received more than 4,800 pesos in 2005 (Q4) are more likely to stay in the program compared to Q1 (having received less than 1,500 pesos in 2005). The probability gap between Q1 and Q4 is around 55 percentage points (significant at the 1% level). However, there is no significant difference between the first three quartiles of cash transfers (Q1, Q2 and Q3).

Column 3 of Table 4 shows an alternative model specification that takes into account the highest cognitive skills score obtained by adult household members. Against our expectations (see section IV), this factor negatively affects the probability of staying in the program, although the fitted coefficient is only significant at the 10% level. One can speculate that households endowed with high cognitive skills are more likely to leave the program because they better assess the imbalance between cash payments and conditionalities-related costs. Moreover, the cognitive skills endowment potentially increases the probability of finding more economically attractive opportunities than social cash transfers (e.g. employment opportunities), which is somewhat consistent with the self-targeting theory (cf. page 6). Consequently, contrary to our intuitions, the omission of cognitive skills (results from Columns 1 and 2) underestimates the positive effects of cash payments and household head's labor incomes on the probability of staying. Indeed, cognitive skills are assumed to be positively correlated with cash payments and income but negatively correlated with program attendance. As explained in section 4, further factors could remain unobserved and bias the results by overestimating the positive effects of household head's incomes on the probability of staying, such as the level of interest in health and education. However, given the high significance and magnitude of estimated coefficients in Table 4, we suppose that such omitted factors do not significantly bias our estimates.

Finally, Columns 4 and 5 of Table 4 present alternative specifications that introduces interaction terms between the household head's labor income and the level of log-transfers. *A priori*, the household head's labor income significantly affects the relationship between cash incentives and the probability of staying in the program. More specifically, Column 4 shows that cash transfers significantly increase the likelihood of staying in the program for upper-income households (Q2, Q3 and Q4), compared to the poorest (Q1). In a simpler fashion (Column 5), one unit increase of log-transfers significantly decreases the probability of staying for the 25% the poorest by -0.6 percentage points,<sup>4</sup> compared to the 75% the richest (coefficient significant at the 1% level). These latter results constitute our more significant contribution to the existing literature. In a nutshell, the poorest households are particularly sensitive to the low amount of payments that characterizes the urban version of the program. We speculate that the urban cash transfers fail to offset the constraints associated with conditionalities compliance (direct and indirect costs, loss of time, preference for current satisfactions, etc.) and thus lead the poorest households to leave the program (*H2* accepted).

## VI. CONCLUSION

In accordance with the seminal works of González-Flores, Heracleous and Winters (2012), we find a positive relationship between household head's incomes and the probability of staying in the program for urban Mexican households. This positive trend disproves the self-targeting theory and thus leads to important exclusion errors. This finding is critical for the program administrators insofar as it questions the efficiency of the program: notwithstanding its objectives, the program fails to target the poorest households in urban settings.

This study contributes to the existing literature by empirically pointing out the role of cash incentives as an important determinant of the concerning number of program exits in urban areas. In line with the take-up theory, our results highlight the imbalance between cash incentives and conditionalities-related constraints that significantly increases exclusion errors and program exits in urban Mexico. Indeed, below a certain threshold, cash supplements may not offset the constraints related to conditionalities compliance (e.g. direct and indirect costs) and then might increase the risk of program exit. Moreover, the low level of cash incentives that characterizes Mexican cities particularly affects the capacity of the poorest households to stay in the program. It means that conditionalities would be particularly difficult to meet for the poorest and most disadvantaged households (as assumed by González-Flores, Heracleous and Winters, 2012). Besides the apparent inability of the program to refrain the poorest participants from leaving, the lack of cash incentives may dissuade many poor households to enroll. Therefore, we can conclude that the relatively low level of cash transfers in urban areas may largely explain the low participation rate and the high exit rate.

As suggested by our results, the cash incentives in Mexican cities would be too low (the same amount than in rural settings) to offset the different constraints related to conditionalities compliance. Since the cost of living

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<sup>4</sup>  $\frac{\Delta Prob(staying)}{\Delta \log(transfers)} = 0.5113 + (-1.107) * \Delta Income_{Q1} = 0.5113 + (-1.107) * 1 = -0.5957$

is higher in cities than in rural Mexico, we recommend adapting the amount of cash transfers according to the urban living cost. In theory, increasing the amount of transfers in urban areas might not only encourage more eligible households to enroll but also may limit the number of dropouts by the poorest beneficiaries. In addition, the reduction in the number of dropouts and exclusion errors has other public interests than fighting poverty. For example, a recent study shows that a long-run enrollment in the program has a protective effect on weight gain (obesity being a huge problem in emerging countries such as Mexico), while by contrast, a short-run enrollment increases the risk of weight gain (Levasseur, 2019). Evidently, additional analyses should determine the most appropriate level of cash transfers for urban settings. To minimize the negative externalities that an extra cash payment could generate, such as migration flows or inclusion errors, the program administrators should take several precautions. For instance, the amount of cash payments should be proportional to the cost of living in the municipality, as well as proportional to the poverty level of the eligible household. Besides the potentially discouraging effect on migration behaviors, such proportional payments may reduce the risk of leaving the program for the poorest households in the most expensive areas. Recall that the risk of leaving the program increases with the household vulnerability and the size of the city.

#### **CONFLICT OF INTEREST**

The author declares that there is no conflict of interests.

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## APPENDIX

**Table A.1: Estimates of scholarships and basic food transfers related to the Mexican CCT program between 1999 and 2012**

	Dec. 1999	Dec. 2002	Dec. 2005	Dec. 2009	Dec. 2012
Basic food transfers per household	125	150	170	202	227
Scholarships per children					
3 <sup>rd</sup> year of primary school	80	96	109	130	145
4 <sup>th</sup> year of primary school	95	114	129	154	173
5 <sup>th</sup> year of primary school	125	150	170	202	227
6 <sup>th</sup> year of primary school	165	198	224	267	300
1 <sup>st</sup> year of secondary school for boys	240	289	326	389	436
2 <sup>nd</sup> year of secondary school for boys	250	301	340	405	454
3 <sup>rd</sup> year of secondary school for boys	265	319	360	429	482
1 <sup>st</sup> year of secondary school for girls	250	301	340	405	454
2 <sup>nd</sup> year of secondary school for girls	280	337	381	453	509
3 <sup>rd</sup> year of secondary school for girls	305	367	414	494	554
Grant for schooling tools per children					
Primary school	165	198	224	267	300
Secondary school	205	246	279	332	373
Cash transfers ceiling per household	750	902	1019	1214	1363
Inflation multiplier	1	1.2024	1.359	1.6188	1.8172

Note: Inflation multiplier is calculated using the consumption price index provided by the Mexican Institute of Statistics.

Source: Initial data of 1999 come from Hernandez, Gomez de León et Vasquez (1999).

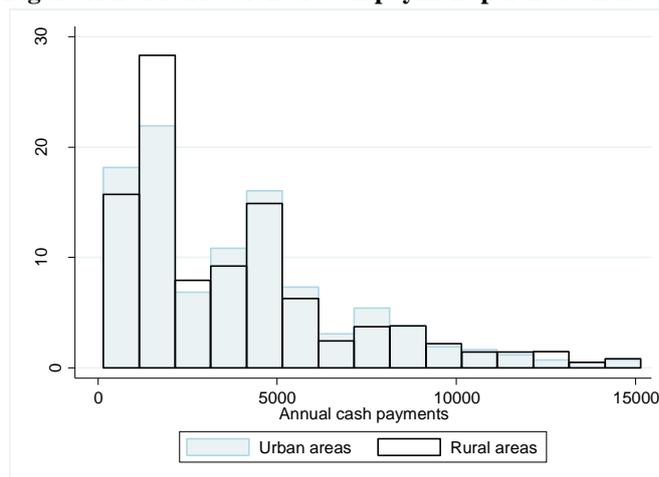
**Table A.2: Variable description**

Variable name	Variable description
Age of the household head	In years.
Sex of the household head	Male=1; Female=0.
Marital status of the household head	In a couple=1; Not in a couple=0.
Number of children in the household by age groups	We consider three age groups: 0-5 y.o (unschooled); 6-12 y.o (primary schooling); 13-15 y.o. (secondary schooling)
Percent of female children	We divide the number of female children (<=15 y.o) by the total number of young household members <=15 years old and then multiply by 100.
Education of the household head	No education=1; Primary education (at least)=0
Highest cognitive skills score obtained by household adult members	The cognitive skills score is measured by the MxFLS using a standard approach based on the Raven matrices. The score varies from 0 (for low cognitive skills) to 100 (for high cognitive skills). We use the highest score obtained by adult members within the household because we have not information for each household member.
Occupational status	4 categories: inactive, unoccupied or unpaid worker (ref.); Informal salaried; formal salaried; self-employed.
Labor income of the household head	Annual labor income of household heads in pesos are then split in quartile for the analysis. Note that labor incomes are corrected from price variations between the Mexican regions using data from the Mexican Institute of Statistics.
Owned assets index	The composite index of household assets adds the six following dummies: a property, a second property, a motorized vehicle, an electronic device, household appliance and electrical cooking appliance. Hence, this index varies from 0 for the poorest households to 6 for the wealthiest.
Infrastructural development index	The composite index of infrastructural development of the municipality adds the five following dummies: public transportation, health center, refuse collection, sewage system and hydraulic system. Hence, this index varies from 0 for the poorest municipality to 5 for the highest developed municipalities.
Demographic dependency ratio	Number of minors (<18 y.o.) and seniors (>65 y.o.) in the household divided by the number of age-working members (between 18 and 65 y.o.).
The annual amount of cash transfers received by the household	Sum of annual payments received by all the household members (in pesos). I analyze this variable using two approaches: a logarithmic transformation (linear approach) and a quartile transformation (nonlinear or categorical approach)

**Table A.3: Price of tortillas and beverages in 2012 according to living areas (in pesos)**

	Mean price of 1kg of tortillas	Mean price of 1 bottle of soda
<b>Urban areas</b>	45	22
<i>higher than 100,000 inhbt</i>	44	23
<i>between 15,000 and 100,000 inhbt</i>	45	21
<i>between 2,500 and 15,000 inhbt</i>	46	19
<b>Rural areas</b>	36	17
<b>Rural vs. Urban mean-comparison test</b>	8	5
<b>(p-value)</b>	(0.000)	(0.000)

Source : MxFLS (2012).

**Figure A.1: Distribution of cash payment per household across living areas**

Source: MxFLS (2002-2012).

**Table A.4: Independence of socioeconomic status on the amount of cash payments received by household participants in 2005**

	N	Mean	Standard deviation	Median
<i>Labor income of the household head (quartile)</i>				
Q1	32	2,691	2,190	2,040
Q2	40	3,066	2,161	2,040
Q3	25	3,182	2,343	2,040
Q4	32	3,381	2,645	2,460
<i>Education of the household head</i>				
Primary education (minimum)	37	3,584	2,771	2,750
No education	115	2,993	2,250	2,040
<i>Occupation of the household head</i>				
Inactive	24	2,373	1,897	2,040
Informal salaried	64	3,172	2,424	2,040
Self-employed	47	3,163	2,430	2,040
Formal salaried	14	3,640	2,320	3,600

Note: All mean-comparison tests between each group are nonsignificant at the 10% level. Thus, we accept the null hypothesis of mean equality between several subsamples.

Source: MxFLS (2005).