



# Does access to free health insurance crowd-out private transfers? Evidence from Mexico's Seguro Popular

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**Abstract** This study examines whether Seguro Popular, a free-of-charge publicly provided health insurance program for otherwise uninsured households, crowded-out private transfers in Mexico. Using data from the National Household Income and Expenditure Survey, the effects of Seguro Popular are identified using the spatial variation in the program's coverage induced by its sequential roll-out throughout Mexico. The results show that Seguro Popular reduced on average a household's probability of receiving private transfers by 5.55 % points. This finding appears to be driven by domestic private transfers, since the program's effects are only statistically significant for private transfers originating within Mexico. In addition, Seguro Popular had a weak and not statistically significant negative effect on the amount of private transfers received. Failure to take into account possible changes in private behaviour induced by Seguro Popular may overstate the program's potential benefits or distributional impacts.

**Keywords** Public health insurance · Crowding-out · Private transfers · Mexico · Seguro Popular

**JEL Classification** I13 · I18 · I38

## 1 Introduction

A number of developing countries have implemented social assistance programs with the purpose of benefiting the population located in the lower tail of the income distribution. Understanding the impact of these programs and how they compare to

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other public policies is central to the development process. This issue is especially salient in Mexico, a country with a per capita income approximately one-third of the U.S. and a high degree of income inequality, characterised by being at the forefront in putting into effect large public assistance programs whose objective is to increase its population's human development levels. Given that such policies are often overlaid on top of pre-existing private support networks, various studies have analysed whether public assistance programs displace or crowd-out private transfers (e.g. Cox and Jimenez 1992; Rosenzweig and Wolpin 1994; Attanasio and Ríos-Rull 2000; Jensen 2003). The present study contributes to this literature by examining whether the introduction of Seguro Popular, a free-of-charge publicly provided health insurance program for informal sector workers, crowded-out private transfers in Mexico.<sup>1</sup>

Seguro Popular covers the costs of 284 unique health care interventions and more than 300 medicines comprising 95.0 % of Mexico's total disease burden (King et al. 2009). For more than 52 million people, Seguro Popular offers a generous means of support since it functions as a source of protection against catastrophic health expenditures, and provides a safety net to many of the country's most vulnerable households. The program has been studied at length by researchers, who have mostly focused on its impact on health expenditures, health outcomes and sector of employment (e.g. King et al. 2009; Barros 2009; Galárraga et al. 2010; Barofsky 2011; Sosa-Rubí et al. 2009; Azuara and Marinescu 2013). The reduction in health expenditures derived from being affiliated in Seguro Popular may be large enough to influence the receipt of private transfers.<sup>2</sup>

If households receive private transfers to alleviate budget constraints, it might be expected that those enrolled in Seguro Popular receive fewer private transfers or stop receiving them altogether, since being affiliated to the program is likely to reduce health expenditures and help alleviate budget constraints by increasing disposable income. Alternatively, if private transfers are not a result of budget constraints or are used for other purposes unrelated to health expenditures, then private transfers might not be affected by enrolment in Seguro Popular. As a result, it is an empirical question whether and to what extent expenses not incurred in resulting from being affiliated to Seguro Popular affect the receipt of private transfers. If the program crowds-out private support, then the study is relevant for policy makers who must take into account this unintended effect of Seguro Popular, since some of the program's goals might have been partially hampered.

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<sup>1</sup> An individual is considered uninsured or an informal sector worker if she or he is not registered with one of Mexico's public social security institutions. According to census data, in 2010 the number of individuals eligible for Seguro Popular equalled 63.2 million or 56.5 % of Mexico's population.

<sup>2</sup> Among the studies that have examined the impact of Seguro Popular on health expenditures, King et al. (2009) using an intent to treat approach observe in treated localities a 23.0 % decrease in catastrophic health expenditures compared to a 8.4 % decrease in control localities. Barros (2009) finds that Seguro Popular reduces both the likelihood of having a positive expenditure on primary health care as well the size of the primary health care expenditures households incur in. Galárraga et al. (2010) observe that households insured with Seguro Popular spent 171 pesos less on outpatient services and 360 pesos less on medicines per year relative to non-enrolled households. Finally, Barofsky (2011) finds that the introduction of Seguro Popular generated a 28.0 % reduction in out-of-pocket health spending among households located in the top quartile of the health expenditure distribution.

The choice to remit is typically preceded by the decision to migrate. Individuals migrate due to a variety of reasons related to income maximisation, minimising risks to family income, or overcoming capital constraints, among others. Prior to the implementation of Seguro Popular, vulnerable households commonly encountered out-of-pocket and catastrophic health expenditures attributed to outpatient care and medication, constraining them to reduce expenses in food, shelter, or education (Galárraga et al. 2010). Migrating and subsequently remitting represented a plausible alternative to overcome these difficulties.

Although declining in recent years, international private transfers represent a significant source of income for Mexican households, accounting for 1.8 % of Mexico's gross domestic product (GDP) in 2012.<sup>3</sup> According to information from the Mexican Migration Project (MMP) 143, Mexican migrants residing in the U.S. commonly claim that one of their main motives for remitting is to cover health expenditures in Mexico. Specifically, when asked to report up to five reasons why they send private transfers to family members left behind, 39.2 % of respondents state as one of their reasons that they send money to Mexico to cover health expenses. This category is only surpassed by food and maintenance, which is claimed to be one of the motives for remitting for 41.8 % of the U.S.-based remitters included in the MMP. On the contrary, education expenses are only reported as one of the reasons for remitting 12.1 % of the time. Consequently, various studies have analysed the relationship between private transfers and health expenditures, generally finding a positive correlation among the two variables (e.g. Airola 2007; Valero-Gil 2008; Amuedo-Dorantes and Pozo 2011).<sup>4</sup>

Given the significant segment of the population that Seguro Popular aimed to cover, the program was expanded gradually throughout Mexico. The variation in Seguro Popular's availability and intensity over time and space allows to identify its causal effects, where differences between regions permit circumventing issues of selection into treatment among the uninsured population. While the expansion of Seguro Popular was not completely random, several studies have relied on the timing and rate of the program's implementation to identify its impact on different outcomes (Bosch et al. 2012).

To date, evidence on the impact of Seguro Popular on private transfers is non-existent, as the literature on Mexico has focused on whether social assistance programs such as Prospera, previously called Progresá and Oportunidades, or 70 y Más, both of which include a cash transfer component, crowd-out private support (e.g. Attanasio and Ríos-Rull 2000; Albarran and Attanasio 2003; Amuedo-Dorantes and Juárez 2015). The related international literature is limited to the study

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<sup>3</sup> At the household level, in 2000 the sum of domestic and international private transfers represented on average 5.0 % of total household income. Among households receiving a positive amount of private transfers, they accounted for 32.0 % of their total income.

<sup>4</sup> Amuedo-Dorantes and Pozo (2011) find that a 100 pesos increase in private transfer income is associated with a 6 pesos increase in health expenditures. In contrast, for other sources of income, a 100 pesos increase is associated with a 2 pesos increase in health expenses. Valero-Gil (2008) estimates that approximately 10.0 % of private transfer income is spent on health care. Moreover, the author observes that while only 2.0 % of households covered by social security institutions receive private transfers, 7.3 % of non-covered households receive private transfers. Finally, Airola (2007) observes that private transfer income is associated with a 44.0 % rise in the consumption share of health care.

by Klohn and Strupat (2013), who investigate whether informal transfers in Ghana were affected by the introduction of a nationwide health insurance scheme. The scholars observe that the policy affected the likelihood of making or receiving informal transfers and their monetary equivalents.

The results show that among households eligible for the program, a 1.0 % increase in the Seguro Popular coverage rate reduced the probability of receiving private transfers by 0.0555 % points. This finding appears to be driven by domestic private transfers, since the program's effect is statistically significant for private transfers originating within Mexico, but is not significant for private transfers sent by foreign-based migrants. Moreover, the results show that Seguro Popular had a weak and non-significant negative effect on the amount of private transfers received. The study suggests that an unintended consequence of Seguro Popular is that the program partially crowds-out private transfers by reducing the likelihood of receiving them.

The study proceeds as follows. Section 2 discusses the motives for remitting and how Seguro Popular may affect private transfers. Section 3 provides background information on the social security system in Mexico and Seguro Popular. Section 4 describes the data. Section 5 presents the methodology. Section 6 discusses the main results. Section 7 tests the sensitivity of the results. Section 8 concludes.

## 2 Conceptual framework

When studying the motives for remitting, the theoretical literature has mainly focused on altruism (e.g. Barro 1974; Becker 1974) and exchange (e.g. Bernheim et al. 1985; Cox 1987). Altruistic private transfers take place because the donor cares about the utility of the recipient. Private transfers motivated by exchange compensate the recipient for providing services to the donor, such as providing informal care or obeying parental rules (Juarez 2009). These alternative motives for remitting can imply drastically different outcomes for public policies that reallocate income (Cox 1987).

Under the altruistic framework, enrolling in Seguro Popular may crowd-out private support as recipients enjoy higher disposable incomes. Barro (1974) and Becker (1974) argue that if households are linked through extensive networks, then changes in private inter-household transfers could completely neutralise the effects of public income redistribution programs. This result arises because in the altruistic model, conditional on remitting, an increase in the recipient's income together with an equal decrease in the donor's income unambiguously causes a decrease in the same amount in the transfer paid to the recipient. Moreover, an increase in the recipient's income keeping the donor's income constant would also cause a decrease in private transfers but to a lesser degree (Juarez 2009).

If private transfers are not motivated by altruism, but instead are part of an explicit exchange of services between recipients and donors, crowding-out may not occur. The reasoning is that an increase in the recipient's income would decrease her or his supply of services and generate an upward movement along the donor's demand, raising the implicit price of services and decreasing the quantity (Juarez

2009). Consequently, the impact of a direct or indirect public transfer on the amount of private transfers received depends on the elasticity of the donor's demand for the services provided by the recipient. In the case where demand is inelastic, which may arise because the services provided are not easily substituted, the amount of private transfers received would increase along with income, reinforcing the effects of the policy (Bernheim et al. 1985; Cox 1987).

Other motives for remitting include a longing to secure access to family resources such as an inheritance (see, e.g. Bernheim et al. 1985; Lucas and Stark 1985), or the desire to invest in physical or financial assets to self-insure or to earn higher economic returns (see, e.g. Durand et al. 1996). On the other hand, private transfers may also be a product of informal risk-sharing agreements between donors and recipients (see, e.g. Rosenzweig 1988). If private transfers are sent for risk-sharing purposes, enrolling in Seguro Popular might have an effect on them since the program provides protection against some of the financial costs associated with ill health. Finally, people may remit simply because the mere act of giving provides them utility or to comply with social norms (Jensen 2003). Under some of these motives, private transfers might not be displaced by increases in the recipient's disposable income.

### 3 Background

#### 3.1 Social security system and health insurance in Mexico

Among the events that helped shape Mexico's health care system was the creation of the Instituto Mexicano del Seguro Social (IMSS, Mexican Social Security Institute) in 1943. The IMSS grouped together the pre-existing union-based and industry-based coverage schemes that offered health services for registered private sector workers (OECD 2005). Subsequently, the Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE, Institute of Security and Social Services for State Workers) was created for registered public sector workers in 1960.<sup>5</sup> While IMSS and ISSSTE were created for registered workers, the Secretaría de Salubridad y Asistencia (SSA, Ministry of Health and Welfare) was created in 1943 to serve the uninsured population outside of the formal sector. This system left workers without formal salaried contracts (i.e. the self-employed, urban informal sector workers, the rural population, the unemployed, and those out of the labour force) and their families generally without health insurance and dependent of the services provided by the SSA (OECD 2005).

Consequently, access to health care in Mexico has been historically linked to work status. Formal sector workers and their families, through social security institutions such as IMSS or ISSSTE, have the right to health services and a range of prescription drugs, and are entitled to a spectrum of benefits including day care,

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<sup>5</sup> A number of systems were also created to provide health insurance to specific industry groups such as workers of Mexico's oil state enterprise PEMEX in 1942 or to armed and naval forces personnel, i.e. citizens enrolled in SEDENA or SEMAR.

maternity leave, work-risk and retirement pensions, and housing loans, among others.

Since the role of the SSA was of social assistance, there was no explicit package of health benefits that the uninsured population was entitled to. In practice, the services provided by the SSA were limited by health budget allocations and the availability of health facilities and medical personnel (Bonilla-Chacín and Aguilera 2013). As a result, the services provided by the SSA were described as limited, frequently unavailable, and often requiring out-of-pocket expenditures (Lakin 2010).

While the health insurance schemes provided by social security institutions were financed by a tripartite arrangement derived from federal government, employer and employee contributions, the SSA was underfunded as it was financed through a combination of federal and state resources.<sup>6</sup> Due in part to the differences in their financing schemes, public health expenditures for individuals covered by social security institutions were twice as high as the expenditures for the uninsured (OECD 2005). These differences led to a lower quality in the health care services provided by the SSA compared to social security institutions.

By 2000, according to census data, 33.0 % of Mexico's 97 million residents were covered by IMSS, 6.0 % were covered by ISSSTE and 2.2 % were covered by another public or private health insurer. The remaining 57.8 % of the population did not have health coverage and were lacking social protection against the financial consequences of ill health (Frenk et al. 2006).

### 3.2 Reform and description of Seguro Popular

In the early 2000s, Mexico implemented a reform to its health system with the intent of achieving universal basic health coverage. At the centre of this reform was Seguro Popular, which represented the most ambitious effort to expand basic health protection since the creation of IMSS (Parker et al. 2010). The program was aimed at uninsured families not covered by social security institutions or without access to any other mechanism of social health insurance.

Seguro Popular was established with the objective of promoting the advanced payment of medical services, encouraging preventing care, and reducing catastrophic health expenses among vulnerable households (DOF 2003). The implementation of Seguro Popular was accompanied by an increase in public health expenditures. Between 2000 and 2010, the SSA budget increased 142.0 %, the budget of IMSS grew 42.0 %, and that of ISSSTE grew 103.0 %. In terms of per capita health expenses, this narrowed the gap between individuals covered by social security institutions and the uninsured population (Knaul et al. 2012).

Funding for Seguro Popular is multilateral, as it is financed by the federal government, state governments and beneficiary families. The provision of services included under Seguro Popular is responsibility of each state's health service

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<sup>6</sup> The term "states" is used as shorthand to refer to Mexico's 31 states and one Federal District, i.e. Mexico City. Each state is divided into municipios, i.e. municipalities. In 2010, there were 2456 municipalities in Mexico.

administration (DOF 2002). Moreover, state governments are responsible for the management of Seguro Popular resources, and they are free to choose the use of the transfers they receive (Barros 2009).

Seguro Popular offers primary, secondary and more advanced medical interventions, as well as access to medications and laboratory clinical studies, all provided free-of-charge. These interventions are classified into six general groups (i.e. public health, general family health and specialty services, dentistry, emergencies, hospitalisation and general surgery) covering more than 90.0 % of all hospital interventions. The program also covers 58 interventions contained in the Fondo de Protección contra Gastos Catastróficos (Protection Fund against Catastrophic Expenses), which includes treatment for prematurely born babies, childhood leukaemia, cervical cancer and HIV.

To register, applicants must reside in Mexico, not be entitled to coverage from a social security institution, present a birth certificate or unique population registration code, and provide a utility bill. Enrolments are formalised at orientation modules located in health centres, clinics and hospitals. Affiliation is not conditioned on health status, pre-existing illness, or co-payments according to the type of health care.

Seguro Popular has a progressive affiliation fee, which substitutes the payment of subsequent services. The program is free to families located at the bottom four deciles of the income distribution. Since the majority of families enrolled in the program have low-income levels, according to data provided by the Comisión Nacional de Protección Social en Salud (CNPSS, National Commission on Social Protection in Health), during the fourth quarter of 2008 Seguro Popular was free to more than 99.0 % of its beneficiaries.<sup>7</sup>

To determine whether families are required to pay the affiliation fee, they are subject to a socioeconomic evaluation. Before being handed an affiliation card, the state's health service administration must confirm that the applicant is not registered in any institution's social security database (DOF 2002). In practice, however, applicants are simply asked whether they are affiliated to a social security institution, where at the time of enrolment this information is not verified (Parker et al. 2010).

By 2010, the budget for Seguro Popular ascended to 48.8 billion pesos, i.e. 3.9 billion U.S. dollars. At the end of 2002 the number of families enrolled in Seguro Popular stood at 295,513. By 2007, 7.3 million families and 21.8 million people were affiliated to the program. By 2012, the number of families and individuals enrolled in Seguro Popular ascended to 20.2 and 52.9 million, respectively, from a pool of approximately 60 million potential beneficiaries.

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<sup>7</sup> Nevertheless, Scott (2006) shows that in 2004 65.0 % of the households affiliated to Seguro Popular were non-poor. Lakin (2010) states that upon the introduction of Seguro Popular, applicants were unwilling to pay the program's affiliation fee. Consequently, to increase participation rates and meet affiliation targets, state governments misclassified families who were subject to the contributory fee as being poor. States have high incentives to enrol a large segment of the population in Seguro Popular since their health service administrations receive federal funds in proportion to the number of families that are affiliated to the program at the beginning of each year.

### 3.3 Implementation of Seguro Popular

Given the substantial segment of the population that Seguro Popular aimed to reach, the program was rolled-out and expanded gradually. Seguro Popular was first put into effect in 2002 as a pilot program in selected localities in five states, i.e. Aguascalientes, Campeche, Colima, Jalisco and Tabasco. These localities were selected based on their social security coverage, their capacity to provide the program's services, their urban and semi-urban concentrations, and the existence of groups already enrolled in assistance programs provided by the federal government (DOF 2002).

In the program's initial rules of operation, it was stated that to implement Seguro Popular, the federal government would subscribe coordination agreements with participating states. Nevertheless, during 2002 and 2003 a number of states started implementing Seguro Popular without having signed a formal agreement. This was possible before 2004 if the municipal government agreed to offer the program (Bosch and Campos-Vázquez 2014). Furthermore, the program's rules of operation established that the future selection of states and regions into Seguro Popular would be based on their proportion and number of uninsured people in the bottom six deciles of the income distribution, the incidence and prevalence of diseases, the existence of the health facilities required to offer the services covered under Seguro Popular, the potential demand for the program's health insurance scheme, and per capita federal contributions (DOF 2002).

In 2003, Seguro Popular was formally established as the Sistema de Protección Social en Salud (Social Protection System in Health). The program's rules of operation were modified where it was stated that Seguro Popular would gradually expand throughout Mexico according to resource availability (DOF 2003). Furthermore, it was specified that the expansion of Seguro Popular would be prioritised in localities according to the set of criteria defined in DOF (2002), while taking into account the explicit request of state authorities to enrol in the program (DOF 2003). At the end of 2004, 30 out of 32 states had signed the coordination agreement with the federal government formalising their participation in Seguro Popular. The remaining two states, i.e. Durango and Mexico City, signed the agreements in 2005.

Additionally, a number of different factors played a role in Seguro Popular's roll-out process. Díaz-Cayeros et al. (2006) argue that political reasons were an important element during the expansion of Seguro Popular. Barros (2009) also shows that political factors affected the program's expansion and claims that because of logistical and political factors that influenced the phase-in process, the size of the program supply was not related to initial levels of economic development or health requirements across states. Bosch and Campos-Vázquez (2014) find that municipalities with larger populations and those located in smaller states joined Seguro Popular at earlier stages. The authors also observe that the implementation date of Seguro Popular and the political affiliation of state governors in post-pilot municipalities are correlated. Nevertheless, in general the scholars do not find evidence towards targeting of Seguro Popular in specific municipalities, since covariates associated with social security coverage, income and industrial structure



are not significant in predicating the date of entry into the program. Finally, Aterido et al. (2011) and Azuara and Marinescu (2013) show that levels of informality in the labour market prior to Seguro Popular being introduced were not correlated with the program's entry date. In general, these studies conclude that the introduction of Seguro Popular was close to random and rely on the variation in the program's expansion or implementation date to identify its effects (Bosch et al. 2012).

## 4 Data

### 4.1 Encuesta Nacional de Ingresos y Gastos de los Hogares

To study the effect of Seguro Popular on private transfers, the Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH, National Household Income and Expenditure Survey) is used. The ENIGH is a nationally representative cross-sectional household survey carried out by Mexico's national statistical agency.

The ENIGH captures individual-level information on each household member's socioeconomic characteristics and different sources of income, including international and domestic private transfers. Nonetheless, the survey does not include information on the characteristics or locality of donors. All net income flows received by the respondent over the previous 6 months are registered. At the household level, the ENIGH captures expenditure data for up to the previous 6 months. All income and expenditure data are self-reported. The study uses the 2000, 2004, 2005, 2006, 2008, 2010 and 2012 editions of the ENIGH, which allows examining the impact of Seguro Popular as the program grew larger.<sup>8</sup> The sample used is limited to economically inactive households and the uninsured, i.e. households not covered by a social security institution and who are, therefore, eligible for Seguro Popular.

### 4.2 Expansion of Seguro Popular

To calculate the expansion of Seguro Popular, a similar strategy to the one put forward by Grogger et al. (2011) is used. First, administrative data provided by the CNPSS on the number of individuals affiliated to Seguro Popular by state and quarter were collected. Subsequently, this information was converted into coverage rates by dividing it by quarterly estimates of the number of individuals eligible for Seguro Popular in each state. Data on the number of eligible or uninsured individuals were drawn from the Encuesta Nacional de Empleo (ENE, National Employment Survey) and from the Encuesta Nacional de Ocupación y Empleo (ENOE, National Occupation and Employment Survey). Coverage rates were constructed for 2004, 2005, 2006, 2008, 2010 and 2012.

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<sup>8</sup> The 2002 edition of the ENIGH is excluded from the study since there is little information regarding Seguro Popular's rules of operation and coverage during its pilot period (Barros 2009). Furthermore, administrative data on the program's coverage was only provided for the fourth quarter of 2002 onwards. Thus, it is not clear what Seguro Popular's coverage was when the ENIGH 2002 was collected between August and November 2002.

Although Seguro Popular started in 2002, the program's initial expansion was low, since at the end of 2003 the average coverage rate within each state stood at 8.0 %. Nevertheless, Seguro Popular rapidly expanded in the following years, where the program's coverage increased to 33.4 % in 2006, 57.5 % in 2009, and 82.5 % in 2012. Additionally, states were introduced to Seguro Popular at different periods, where the program grew at different rates within each state. For example, while at the end of 2002 Colima had a coverage rate of 57.3 %, during the same period 12 states had a coverage rate of zero. Finally, while in 2004 Nuevo Leon and Zacatecas had similar coverage rates of 6.7 and 7.1 %, respectively, by 2010 these figures had grown and diverged to 62.6 and 81.3 %, respectively.

## 5 Methodology

To examine whether Seguro Popular crowds-out private transfers among eligible households, the program's expansion throughout Mexico is exploited. Seguro Popular was introduced at different points and with different coverage rates between states, as the program's availability and the share of eligible individuals covered by Seguro Popular varied between regions.

The variation in the expansion of Seguro Popular has been widely used (e.g. Barros 2009; Aterido et al. 2011; Grogger et al. 2011; Azuara and Marinescu 2013; Bosch and Campos-Vázquez 2014). To make use of this variation over time and space, I put forward a strategy similar to Grogger et al. (2011) and estimate the following model:

$$y_{hst} = \gamma SP_{st} + X_{hst}\beta + W_{mt}\theta + Z_{st}\lambda + \delta_t + \mu_s + \epsilon_{hst} \quad (1)$$

where  $y_{hst}$  denotes the amount of total, international or domestic private transfers received by household  $h$  in state  $s$  in year  $t$ ;  $SP_{st}$  represents the Seguro Popular coverage rate in state  $s$  in year  $t$ ;  $X_{hst}$  denotes a vector of household level characteristics that may affect private transfer receipt;  $W_{mt}$  and  $Z_{st}$  represent vectors of municipality and state-level variables, respectively;  $\delta_t$  represents a time period dummy which helps control for national trends in private transfer receipt;  $\mu_s$  denotes state fixed effects that capture time-invariant characteristics which may affect private transfer receipt and the availability or scope of Seguro Popular coverage in the state; and  $\epsilon_{hst}$  is a random error term assumed to be uncorrelated with  $SP_{st}$ ,  $X_{hst}$ ,  $W_{mt}$  and  $Z_{st}$ .<sup>9</sup>

To analyse the impact of Seguro Popular on the amount of private transfers received, i.e. the intensive margin, Eq. (1) is estimated using ordinary least squares (OLS). When studying the effect of Seguro Popular on the probability of receiving private transfers, i.e. the extensive margin, Eq. (1) is estimated using OLS as a linear probability model (LPM). In the latter case,  $y_{hst}$  represents a binary variable that takes the value of one if household  $h$  receives a positive amount of private transfers or zero otherwise. Both models include as covariates the Seguro Popular

<sup>9</sup> Various regressions presented in Sects. 6 and 7 include  $\mu_m$ , which denotes municipality fixed effects, in place of  $\mu_s$ .

coverage rate at the state level; the household head's age, years of schooling and gender; the number of household members under age 12; the number of household members age 65 and older; indicator variables for low-quality roofs, floors, and walls in the household; a dichotomous variable denoting whether the household is located in a rural locality; and a set of state or municipality and year dummy variables. Municipality-level controls introduced in Eq. (1) include government revenue, number of housing credits granted and number of workers affiliated to IMSS. State-level variables include the state population and binary variables indicating the political affiliation of the Governor.<sup>10</sup> Equation (1) also includes an indicator variable denoting whether any of the household's members receives a scholarship or transfer from Prospera. Prospera is a poverty reduction cash transfer program with education and health components, where households receive transfers conditional on sending their children to school and visiting health clinics.<sup>11</sup> Equation (1) is estimated separately for total, international and domestic private transfers.<sup>12</sup> Standard errors are clustered by state to account for possible correlation among households in some unknown way.<sup>13</sup>

## 6 Results

### 6.1 Descriptive statistics

Table 1 displays the means of selected variables of the uninsured households included in the study. It can be seen that in 2000, 19.4 % of households received private transfers. By 2006 this figure had risen to 25.6 %, but by 2012 it had declined to 25.0 %. Disaggregating total private transfers, it can be seen that during these three periods the percentage of households receiving domestic private transfers increased from 14.1 % in 2000, to 18.1 % in 2006, and 19.7 % in 2012. On the other hand, the number of households receiving international private transfers increased from 6.2 % in 2000 to 8.9 % in 2006. Nonetheless, this figure dropped to 6.6 % in 2012. Concerning the amount of private transfers received, a similar but

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<sup>10</sup> Information on the political affiliation of state Governors was taken from the CIDAC electoral data base. See [http://www.cidac.org/eng/Electoral\\_Database.php](http://www.cidac.org/eng/Electoral_Database.php).

<sup>11</sup> Beneficiaries of Prospera are also eligible for Seguro Popular. The original Prospera program included a health component which covered 13 medical interventions. Frenk et al. (2006) argue that while Prospera proved to be a valuable instrument in reducing poverty and improving health levels, a significant proportion of the cash transfers received by affiliated families were used to finance medical care not included in the program's catalogue of interventions.

<sup>12</sup> Distinguish between international and domestic private transfers is important since they may be crowded-out to different degrees as a result of differences in donor characteristics, motivation, or information about the program (Amuedo-Dorantes and Juarez 2015).

<sup>13</sup> While some studies exploit the municipality level variation in the availability of Seguro Popular, this study mainly focuses on the program's expansion at the state level. Obtaining the coverage ratio of Seguro Popular at the municipality level is problematic because information on the number of individuals eligible for Seguro Popular at the municipality level can only be obtained from either the 2000 and 2010 censuses or the 2005 population count. Nevertheless, Sect. 7.3 exploits the municipality level variation of Seguro Popular using the program's availability instead of its coverage rate.

**Table 1** Descriptive statistics

Variable	2000	2004	2005	2006	2008	2010	2012
Received private transfers (%)	0.194	0.209	0.211	0.256	0.218	0.205	0.250
Received international private transfers (%)	0.062	0.057	0.068	0.089	0.077	0.059	0.066
Received domestic private transfers (%)	0.141	0.160	0.151	0.181	0.155	0.155	0.197
Private transfers received	387.9	458.7	449.1	569.5	355.7	311.5	264.2
International private transfers received	140.6	168.9	184.0	286.1	176.8	137.6	105.2
Domestic private transfers received	247.3	289.8	265.0	283.4	178.9	173.8	159.0
Rural locality (%)	0.435	0.300	0.342	0.349	0.343	0.345	0.530
HH head male (%)	0.823	0.782	0.783	0.767	0.791	0.806	0.799
HH head years of schooling	5.68	7.40	7.17	7.21	7.05	7.05	6.41
Total income	7692.3	9764.3	9109.7	9327.3	9251.5	7020.4	6604.8
Total expenditures	7534.1	10,052.6	8909.1	9586.5	8105.4	7360.6	6707.1
Health expenditures	194.9	257.5	224.9	264.5	175.9	139.9	122.1
Seguro Popular coverage by state (%)	0	0.136	0.254	0.334	0.538	0.759	0.825
Observations	4779	9142	9984	8759	9850	8864	3476

Source: Author's elaboration based on the ENIGH. HH denotes households. Monetary figures are per month and in real 2006 Mexican pesos

more pronounced pattern is detected. In 2000, the average amount of private transfers received stood at 387.9 pesos per month. By 2006, this figure had increased to 569.5, but by 2012 it had declined to 264.2 pesos per month. Distinguishing between the amount of international and domestic private transfers received, it is observed that they both followed a similar pattern to that of total private transfers.

With respect to other variables, it is observed that while household income increased by 21.3 % between 2000 and 2006, it encountered a sharp decline between 2006 and 2012 falling by 29.2 %. Household expenditures faced a similar pattern increasing by 27.2 % between 2000 and 2006, and subsequently declining by 30.0 % between 2006 and 2012. As a result, during the period of study, the average household included in the sample went from being a net saver to a net debtor. On the other hand, household health expenditures, which stood at 194.8 pesos per month in 2000, increased to 264.5 in 2006, but decreased to 122.1 pesos per month in 2012. Nevertheless, looking at the raw data it is not possible to identify how much of this decline is due to a reduction in household income or is a result of the implementation of Seguro Popular. Concerning the socio-demographic variables included in the table, it is noteworthy to mention that the proportion of households located in rural areas varies significantly between years. This variation in the sampling likely affects other variables such as the average years of schooling of the household head, and highlights the importance of controlling for additional factors when performing the econometric analysis. Finally, looking at the Seguro Popular coverage rate by state, in 2006 an average of 33.4 % of the households in each state were enrolled in the program. By 2012, the coverage rate had grown to 82.5 %.

## 6.2 Does Seguro Popular crowd-out private transfers?

Results of the effect of Seguro Popular on private transfers based on Eq. (1) are presented in Table 2.<sup>14</sup> In all columns, the first row shows the coefficient of the Seguro Popular (SP) coverage rate at the state level. It can be seen in column (1) that Seguro Popular had a negative but not statistically significant effect on the amount of private transfers received. Under the preferred specification presented in column (2), which includes a full set of controls as well as municipality fixed effects, it is estimated that Seguro Popular reduced on average the monthly amount of private transfers received by 50.86 pesos. While the coefficients are negative, since they are not statistically significant, it is not possible to state that the implementation of Seguro Popular affected the amount of private transfers received.<sup>15</sup> Focusing on other variables, it is observed that male-headed households

<sup>14</sup> The validity of the identification strategy used in this study is examined in the Appendix, i.e. the exogeneity of Seguro Popular's implementation across regions.

<sup>15</sup> On the other hand, when Eq. (1) is estimated using health expenditures as the dependent variable, the effect of Seguro Popular is that the program reduced health expenditures by 92.03 pesos per month. This estimation includes a full set of controls as well as municipality fixed effects and is statistically significant at the 10.0 % level. Moreover, this result is always significant and is relatively consistent across different specifications. See Table 9 in the Appendix.

**Table 2** SP coverage and total private transfers

Variable	(1) OLS: amount of private transfers received	(2)	(3) LPM: probability of receiving private transfers	(4)
SP coverage at the state level	-118.6 (116.8)	-50.86 (128.8)	-0.0577* (0.0333)	-0.0555* (0.0297)
HH head age	-4.128*** (1.260)	-4.345*** (1.325)	0.0012*** (0.0003)	0.0011*** (0.0003)
HH head years of schooling	34.18*** (4.657)	33.89*** (4.422)	-0.0009* (0.0005)	-0.0005 (0.0006)
HH head male	-1058.5*** (74.22)	-1041.5*** (73.60)	-0.3220*** (0.0140)	-0.3150*** (0.0137)
HH enrolled in Prospera	-3.860 (17.67)	-0.0155 (17.18)	-0.0112** (0.0048)	-0.0160*** (0.0044)
HH members under age 12	-14.19 (9.195)	-16.32* (9.115)	-0.0032 (0.0020)	-0.0031 (0.0020)
HH members age 65 and older	19.66 (19.79)	13.50 (21.73)	0.0440*** (0.0070)	0.0425*** (0.0069)
Good quality walls in the HH	35.38 (21.90)	47.61** (22.73)	0.0130 (0.0110)	0.0183* (0.0099)
Good quality roofs in the HH	141.8*** (17.12)	130.6*** (18.29)	0.0196*** (0.0053)	0.0158*** (0.00513)
Good quality floors in the HH	95.42*** (18.55)	66.16*** (19.91)	0.0341*** (0.0063)	0.0241*** (0.0059)
Rural locality	166.9*** (31.57)	173.9*** (57.87)	0.0511*** (0.0081)	0.0446*** (0.0083)
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	No	Yes	No
State-level controls	Yes	Yes	Yes	Yes
Municipality fixed effects	No	Yes	No	Yes
Municipality-level controls	Yes	Yes	Yes	Yes
Observations	54,854	54,854	54,854	54,854

Source: Author's elaboration based on the ENIGH. State-level controls include the state population size and binary variables that indicate the political affiliation of the Governor. Municipality-level controls include government revenue, number of housing credits granted and number of workers affiliated to IMSS. Monetary figures are in real 2006 pesos. Standard errors are clustered at the state level

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

receive a lower amount of private transfers than female-headed households. Moreover, residing in a household located in a rural locality is positively and statistically significantly associated with the amount of private transfers received. Additional variables which influence the amount of private transfers received include indicators of the quality of the household and the number of years of schooling of the household head, which are positively associated with the outcome of interest; and the age of the household head, which is negatively associated with the dependent variable.

Table 2 also presents results where the relationship between Seguro Popular and the likelihood of receiving private transfers is analysed. It is observed in column (3) that the relationship between Seguro Popular and the probability of receiving private transfers is negative and statistically significant. Column (4) shows that when a full set of controls are introduced, including municipality fixed effects, the estimated effect of Seguro Popular is that a 1.0 % increase in its coverage rate reduced the probability of receiving private transfers by 0.0555 % points, where this coefficient is significant at the 10.0 % level. Additionally, since the crowding-out effect is only observed at the extensive margin, it is possible to quantify this estimate in pesos. This is done by multiplying the effect reported in column (4) by the mean amount of private transfers received by uninsured households prior to the program's introduction. Since the mean amount of private transfers received by households in 2000 was 387.9 pesos per month, multiplying this amount by the estimated coefficient of  $-0.0555$  produces a reduction of 21.5 pesos per month, which is equal to 23.3 % of the estimated effect of Seguro Popular on health expenditures. Concerning the other variables, male-headed households have a lower probability of receiving private transfers than female-headed households. Moreover, households located in rural localities have a higher likelihood of receiving private transfers than those located in urban settings. Further variables which affect the probability of receiving private transfers include indicators of the quality of the household, the age of the household head, and the number of household residents over 65, all of which are positively associated with the probability of receiving private transfers; and being enrolled in Prospera, which is negatively associated with the dependent variable.<sup>16</sup>

To study whether the previous findings are driven by private transfers originating from Mexico or abroad, Table 3 presents estimations where private transfers are classified as international or domestic according to the sender's country of residence. It is observed that the introduction of Seguro Popular did not have a statistically significant effect on either the amount of international private transfers received or on the probability of receiving them. In fact, when a full set of control are added the coefficient becomes positive although not significant. Focusing on domestic private transfers, it can be seen that under all the different specifications the relationship between Seguro Popular and the amount of domestic private transfers received is negative. When a full set of controls are introduced, including municipality fixed effects, it is estimated that the program reduced the amount of

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<sup>16</sup> Table 10 in the Appendix allows for a more flexible specification of Eq. (1), where the program's effects are assumed to differ by year.

**Table 3** SP coverage and international and domestic private transfers

Variable	International		Domestic	
	(1)	(2)	(3)	(4)
<i>OLS: amount of private transfers received</i>				
SP coverage at the state level	-43.57 (57.06)	21.62 (71.12)	-75.03 (114.0)	-72.48 (115.4)
<i>LPM: probability of receiving private transfers</i>				
SP coverage at the state level	-0.0107 (0.0237)	-0.0021 (0.0248)	-0.0540* (0.0313)	-0.0625* (0.0321)
HH-level controls	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	No	Yes	No
State-level controls	Yes	Yes	Yes	Yes
Municipality fixed effects	No	Yes	No	Yes
Municipality-level controls	Yes	Yes	Yes	Yes
Observations	54,854	54,854	54,854	54,854

Source: Author's elaboration based on the ENIGH. HH-level controls include the variables presented in Table 2. State-level controls include the state population size and binary variables that indicate the political affiliation of the Governor. Municipality-level controls include government revenue, number of housing credits granted and number of workers affiliated to IMSS. Monetary figures are in real 2006 pesos. Standard errors are clustered at the state level

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



domestic private transfers received by 72.48 pesos per month. Nonetheless, this coefficient is not significant. Turning our attention to the probability of receiving private transfers, when a full set of controls are included, the estimated effect of Seguro Popular is that it reduced the likelihood of receiving domestic private transfers by 6.25 percentage points, where this coefficient is statistically significant at the 10.0 % level. These results suggest that the findings presented in Table 2 are driven by domestic private transfers, since Seguro Popular does not have an effect on international private transfers at either the intensive or extensive margins. The previous findings may arise because most senders located within Mexico are aware of Seguro Popular and, therefore, changed their remitting behaviour upon the program's introduction. This is likely to be case since the program was widely publicised by the federal government. On the other hand, a large number of senders located in foreign countries may not be aware of the program and consequently did not alter their remitting behaviour. Alternatively, domestic and international donors may have different motives for remitting and thus reacted differently upon the implementation of Seguro Popular.<sup>17</sup>

## 7 Sensitivity checks

### 7.1 Tobit and logit models

This section examines the sensitivity of the results to the use of a tobit model when analysing the effect of Seguro Popular on the amount of private transfers received, and to the use of a logit specification when studying its impact on the likelihood of receiving private transfers. Tobit estimations presented in Table 4 columns (1) and (2) show that Seguro Popular had a negative and statistically significant negative effect on the amount of private transfers received. This finding differs from the OLS results, where although it was observed that the program had a negative impact on the amount of private transfers received, the effect was not statistically significant. Focusing on the extensive margin, logit estimations presented in column (4) show that a 1.0 % increase in Seguro Popular's coverage rate reduced the probability of receiving private transfers by 0.0654 % points. This coefficient is statistically significant at the 10.0 % level, and larger than the one obtained from the LPM estimations presented in Table 2.

### 7.2 Different subsamples

To further analyse the sensitivity of the results, Table 5 presents estimations of Eq. (1) when focusing on different population groups or when the ENIGH's survey weights are used. Panel A presents the results obtained in Table 2, so that

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<sup>17</sup> This result is similar to that obtained by Amuedo-Dorantes and Juarez (2015), who analyse whether the 70 y Más program for the rural elderly in Mexico crowded-out private transfers. In their study, the scholars observe a crowding-out effect at the extensive margin but not at the intensive margin. Moreover, their results are largely driven by a reduction in the likelihood of receiving domestic private transfers.

**Table 4** SP coverage and total private transfers. Marginal effects

Variable	Tobit: amount of private transfers received		Logit: probability of receiving private transfers	
	(1)	(2)	(3)	(4)
SP coverage at the state level	-206.4** (102.2)	168.0* (87.35)	-0.0669* (0.0343)	-0.0654* (0.0342)
HH head age		2.111*** (0.7987)		0.0013*** (0.0003)
HH head years of schooling		9.817*** (1.973)		-0.0010* (0.0005)
HH head male		-1100.8*** (61.87)		-0.3280*** (0.0083)
HH enrolled in Prospera		-22.96* (12.63)		-0.0099** (0.0048)
HH members under age 12		-13.07** (5.812)		-0.0035 (0.0022)
HH members age 65 and older		84.34*** (15.09)		0.0391*** (0.0059)
Good quality walls in the HH		45.51 (29.37)		0.0152 (0.0123)
Good quality roofs in the HH		77.97*** (12.97)		0.0190*** (0.0053)
Good quality floors in the HH		89.17*** (14.23)		0.0341*** (0.0061)
Rural locality		150.31*** (23.73)		0.0538*** (0.0079)
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
State-level controls	No	Yes	No	Yes
Municipality fixed effects	No	No	No	No
Municipality-level controls	No	Yes	No	Yes
Observations	54,854	54,854	54,854	54,854

Source: Author's elaboration based on the ENIGH. For the tobit, figures reported denote the unconditional marginal effects. HH denotes households, state-level controls include the state population size and binary variables that indicate the political affiliation of the Governor. Municipality-level controls include government revenue, number of housing credits granted and number of workers affiliated to IMSS. Monetary figures are in real 2006 pesos. Standard errors are clustered at the state level

**Table 5** SP coverage and private transfers. Subsamples

Sample	OLS: amount of private transfers received		LPM: probability of receiving private transfers	
	(1)	(2)	(3)	(4)
A. Main	-118.6 (116.8)	-50.86 (128.8)	-0.0577* (0.0333)	-0.0555* (0.0297)
B. Men-women				
Men	-44.01 (81.18)	0.1090 (104.4)	-0.0474 (0.0334)	-0.0506 (0.0347)
Women	-548.6 (430.7)	-499.0 (471.0)	-0.1160* (0.0623)	-0.0892 (0.0662)
C. Urban-rural				
Urban	-125.6 (152.6)	-124.5 (166.4)	-0.0488 (0.0334)	-0.0444 (0.0347)
Rural	-65.11 (173.4)	-8.376 (202.1)	-0.0759 (0.0509)	-0.0776 (0.0512)
D. Low- and high-income households				
Low	-74.72* (38.18)	-42.91 (42.02)	-0.0516 (0.0437)	-0.0677 (0.0436)
High	-110.3 (211.8)	-21.58 (234.8)	-0.0592* (0.0345)	-0.0457 (0.0341)
E. Low- and high-health expenditure households				
Low	-249.9** (113.3)	-222.3* (122.4)	-0.0628 (0.0432)	-0.0762* (0.0383)
High	33.27 (156.3)	145.1 (185.0)	-0.0458 (0.0365)	-0.0273 (0.0370)
F. Weighted results	-99.26 (129.4)	-38.66 (123.8)	-0.0236 (0.0440)	-0.0285 (0.0332)
G. Conditional on receiving a positive amount of private transfers	-100.9 (443.1)	126.1 (535.9)	-	-
HH-level controls	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	No	Yes	No
State-level controls	Yes	Yes	Yes	Yes
Municipality fixed effects	No	Yes	No	Yes

**Table 5** continued

Sample	OLS: amount of private transfers received	LPM: probability of receiving private transfers
	(1)	(3)
Municipality-level controls	Yes	Yes
		(4)
	Yes	Yes

Source: Author's elaboration based on the ENIGH. Figures presented represent coefficient estimates for SP coverage at the state level. HH-level controls include the variables presented in Table 2. Low- and high-income households refer to the households located above and below the median of the household income distribution, respectively. Low- and high-health expenditure households refer to the households located above and below the median of the household health expenditure distribution, respectively. State-level controls include the state population size and binary variables that indicate the political affiliation of the Governor. Municipality-level controls include government revenue, number of housing credits granted and number of workers affiliated to IMSS. Monetary figures are in real 2006 pesos. Standard errors are clustered at the state level

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

comparisons with the study's main findings can be more easily made. Panels B to G report the different sensitivity checks.

Panel B shows that Seguro Popular had different effects which varied according to the gender of the household head. The program had a stronger impact in female-headed households at both the intensive and extensive margins. Nonetheless, when a full set of controls are included, due to the large standard errors, the estimated coefficients are generally not significant. It is only in column (3), when estimating the program's effect on the probability of receiving private transfers for women and when state fixed effects are included, that a negative and significant effect of 11.6 % points is observed.

Panel C analyses the effect of Seguro Popular in urban and rural localities. These coefficients are quite similar to one another and to the one displayed in Panel A. Moreover, even though the coefficients are not statistically significant, it can be seen in column (2) that when a full set of controls are added, the program's effect is larger in urban settings. This result may be related to the finding presented in Grogger et al. (2011), where the authors state that the program's impact is stronger in urban localities, since health centres and hospitals located in cities are better equipped and generally offer all of the interventions covered under Seguro Popular. On the other hand, health facilities located in rural localities are frequently limited in the amount of the services they provide. Consequently, the impact of Seguro Popular on health expenditures tends to be lower in rural localities. Nevertheless, column (4) shows that the program's effect on the likelihood of receiving private transfers, although not significant, is larger in absolute value in rural areas.

Panel D differentiates between low- and high-income households. The program's effect is relatively stable throughout the income distribution, where the effect of Seguro Popular at both the intensive and extensive margins is similar for both groups. Moreover, these effects closely resemble those presented in Panel A, where their weaker significance is partly driven by their smaller sample sizes.<sup>18</sup>

Panel E separates households according to whether they incur in high- or low-health expenditures. The program's effect is much stronger in low-health expenditure households. When focusing on the effect of Seguro Popular on the amount of private transfers received, it is observed that the estimated coefficients are negative and significant in low-health expenditure households. Moreover, it can be seen in column (2) that when a full set of controls are included, the program's effect rises to 222.3 pesos per month. For high-health expenditure households, the coefficients are not significant. Focusing on the extensive margin, column (4) shows that in low-health expenditure households the introduction of Seguro Popular reduced the likelihood of receiving private transfers by 7.62 percentage points, where this coefficient is statistically significant at the 10.0 % level. In high-health expenditure households, it is estimated that a 1.0 % increase in the program's

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<sup>18</sup> Since the division of low and high-income households according to whether they are below or above the median may seem arbitrary, estimations were also performed where households were classified depending on whether they fall below or above the mean. Households were also grouped by quartiles, where a comparison was made between those located at the lowest and highest quartiles. The results presented in Panel D in Table 5 are robust to these different specifications.

coverage reduced the probability of receiving private transfers by 0.0273 percentage points. Nonetheless, this coefficient is not significant.

Panel F makes use of the household weights included in the ENIGH. The results show that, when household weights are used, the impact of Seguro Popular on the amount of private transfers received is generally negative and not statistically significant. Concerning the program's impact on the likelihood of receiving private transfers, it can be seen in columns (3) and (4) that when a full set of controls are included, although negative, neither of the coefficients are significant.

Finally, Panel G focuses on households that report receiving a positive amount of private transfers. When state fixed effects are used along with a full set of controls, it is estimated that Seguro Popular reduced private transfers by 100.9 pesos per month. When municipality fixed effects are used, the effect of Seguro Popular is limited to an increase of private transfer income of 126.1 pesos per month. Nevertheless, neither of these two coefficients are statistically significant. These results offer additional evidence that the introduction of Seguro Popular did not affect the amount of private transfers received.<sup>19</sup>

### 7.3 Municipality-level variation

This section exploits the municipality-level variation in the availability of Seguro Popular. Defining the availability of Seguro Popular in each municipality involves outlining an arbitrary threshold, since there is no official record of when the program's services were initially offered in each municipality.<sup>20</sup> In this study, a municipality is considered as having direct access to Seguro Popular when in its first observed in any given period that ten or more of its households are affiliated to the program.

Table 6 presents results of Eq. (1) at both the intensive and extensive margins, where the availability of Seguro Popular at the municipality level is introduced as a binary variable in place of the program's coverage rate at the state level. Panel A

<sup>19</sup> Since the introduction of Seguro Popular partially crowded-out private transfers and the program reduced health expenditures by an even larger amount, the matter of how households used their additional income derived from being affiliated to the program was also examined. Equation (1) was estimated with a full set of controls with the dependent variable being household savings or a variety of expenditure categories such as food, clothing, housing, transportation or education. In results not presented, the estimated equations show that the introduction of Seguro Popular did not affect household savings, suggesting that the additional resources were likely used for consumption purposes. The different expenditure categories were also unaffected by the program's introduction. These results are likely to arise because health expenditures constitute a very small fraction of total household expenses. Thus, even if Seguro Popular reduced health expenditures, its effect may not be large enough to influence household expenses in other categories. Nonetheless, this result may also be a product of measurement error which is a common issue when working with expenditure data.

<sup>20</sup> In each state where Seguro Popular was introduced, it was up to the local government to undertake the actions required to identify beneficiary groups, their affiliation and the programs diffusion within their state (DOF 2002). Thus, the decision of which municipalities were affiliated first was based on agreements with local governments, where each state decided to implement Seguro Popular according to its own goals, while generally satisfying the rules of operation of the program (Bosch and Campos-Vázquez 2014). Moreover, the extent of Seguro Popular's coverage within each municipality was decided by the municipal governments and was based on numerous factors including the availability of resources related to health infrastructure and health personnel.

**Table 6** SP availability and private transfers. Municipality-level variation

Sample	OLS: amount of private transfers received		LPM: probability of receiving private transfers	
	(1)	(2)	(3)	(4)
A. Full sample	-28.05 (28.56)	2.660 (36.43)	-0.0097 (0.0081)	-0.0145* (0.0084)
B. First quartile	-46.57*** (13.88)	-37.80** (18.54)	-0.0249* (0.0129)	-0.0358** (0.0178)
C. Second quartile	-14.72 (25.91)	5.351 (28.94)	0.0004 (0.0137)	-0.0128 (0.0158)
D. Third quartile	-64.15* (38.05)	-53.92 (41.23)	-0.0190 (0.0130)	-0.00611 (0.0148)
E. Fourth quartile	83.41 (91.44)	88.26 (126.0)	-0.0031 (0.0143)	-0.0067 (0.0165)
HH-level controls	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	No	Yes	No
State-level controls	Yes	Yes	Yes	Yes
Municipality fixed effects	No	Yes	No	Yes
Municipality-level controls	Yes	Yes	Yes	Yes

Full sample and divided by position in the income distribution

Source: Author's elaboration based on the ENIGH. Figures presented represent coefficient estimates for SP availability at the municipality level. HH-level controls include the variables presented in Table 2. State-level controls include the state population size and binary variables that indicate the political affiliation of the Governor. Municipality-level controls include government revenue, number of housing credits granted and number of workers affiliated to IMSS. Monetary figures are in real 2006 pesos. Standard errors are clustered at the municipality level

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

includes all households in the sample. Panels B through E divide the sample by quartiles according to the household's position in the income distribution.<sup>21</sup>

Column (1) of Panel A shows that when a full set of controls are introduced jointly with state fixed effects, the negative effect of Seguro Popular on the amount of private transfers received stands at 28.05 pesos per month, where this effect is not statistically significant. When municipality fixed effects are used as in columns (2), this effect becomes positive but remains non-significant. Focusing on the extensive margin, it is observed in column (4) that, when a full set of controls is included along with municipality fixed effects, the program reduced the likelihood of receiving private transfers by 1.45 percentage points, where this result is statistically significant at the 10.0 % level. Consequently, an analysis that uses the program's availability at the municipality level provides further evidence that Seguro Popular did not crowd-out private transfers at the intensive margin. On the other hand, it supports the finding that the program had weak but statistically significant effect at the extensive margin.

Focusing on households located at different parts of the income distribution, Panel B shows that the program's effect was stronger among households located in the bottom quartile. Column (1) shows that at the intensive margin, when a full set of controls are introduced including state fixed effects, it is estimated that Seguro Popular reduced the amount of private transfers received by 46.57 pesos per month, where this coefficient is statistically significant at the 1.0 % level. Moreover, when municipality fixed effects are used, it is observed in column (2) that the program reduced private transfers by 37.80 pesos per month, where this coefficient is significant at the 5.0 % level. At the intensive margin, similar results are found. Column (3) shows that, when a full set of controls are used including state fixed effects, it is estimated that the program reduced the likelihood of receiving private transfers by 2.49 % points. When municipality fixed effects are incorporated, it can be seen in column (4) that Seguro Popular reduced the likelihood of receiving private transfers by 3.58 % points, where this coefficient is significant at the 5.0 % level. Finally, regarding the households located in the top three quartiles of the income distribution, Panels C, D and E show that in general Seguro Popular did not affect private transfers at either the intensive or extensive margins. The program's effect might be larger among low-income households given that they are actually more likely to be enrolled in Seguro Popular relative to higher income households. Furthermore, the fact that the program crowds-out private support among low-income households but not among those located higher in the income distribution may be a result of differences in the motives for remitting among donors depending on the receiving household's level of income.

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<sup>21</sup> While generally consistent, when using Seguro Popular's availability at the municipality level as the main explanatory variable, the magnitude of the estimated coefficients is dependent on which threshold is used to denote when the program first became available in each municipality. Furthermore, using the program's availability instead of its coverage rate conceals substantial information, particularly considering that the study covers a period of both low and high Seguro Popular coverage. Due to these shortcomings, estimations when using the program's state coverage rate instead of its municipality availability are presented as the main results.



## 7.4 Donors

Since the ENIGH collects information on household expenditures, it is possible to focus on donors instead of recipients and examine the effect of Seguro Popular on the amount of private transfers sent and on the probability of remitting a positive amount.<sup>22</sup> To calculate the effect of Seguro Popular on donors, Eq. (1) is again estimated where the dependent variable is either the monthly amount of private transfers sent or a dichotomous variable that takes the value of one if the household remitted a positive amount during the previous 6 months or zero otherwise. Additionally, to minimise unobserved heterogeneity that may affect remitting behaviour, households are classified according to whether they are eligible or ineligible for Seguro Popular.

Table 7 shows that among households eligible for Seguro Popular, when a full set of controls are introduced along with state fixed effects, it is estimated that the program increased the amount of private transfers sent by 10.92 pesos per month, where this effect is not statistically significant. When municipality fixed effects are included, the effect increases to 18.48 pesos per month but is once again non-significant. With respect to the program's effect on the probability of remitting, a similar relationship is observed. Whether state- or municipality fixed effects are included along with a full set of controls, it is estimated that Seguro Popular increased the probability of remitting, where this effect is never statistically significant.

Concerning how the introduction of Seguro Popular affected the remitting behaviour of households that were not eligible for the program, a different pattern is observed. Column (3) shows that, when state fixed effects are used, it is estimated that Seguro Popular reduced the amount of private transfers sent by 149.7 pesos per month, where this coefficient is significant at the 10.0 % level. When municipality fixed effects are incorporated jointly with a full set of controls, it is estimated that the program's introduction reduced the amount of private transfers sent by 157.6 pesos per month, where this effect is once again significant at the 10.0 % level. With respect to the probability of remitting, it is observed that Seguro Popular reduced the probability of remitting among ineligible households between 2.93 and 4.38 % points. Nevertheless, these coefficients are not statistically significant.

In summary, the results show that while the introduction of Seguro Popular did not affect the remitting behaviour of households that were eligible for the program, it did affect the remitting behaviour of households that were not eligible to enrol in Seguro Popular. This may be driven by the fact that households covered by social security institutions are much more likely to remit than those who are uninsured. Specifically, prior to the program's introduction in 2000, approximately 18.2 % of insured households remitted compared to 10.5 % among uninsured households. Moreover, among households that remitted a positive amount, insured households donated on average 425.2 pesos per month compared to 281.4 among uninsured households. On

<sup>22</sup> While it is likely that the majority of the private transfers sent by the donors included in the ENIGH are directed towards families residing within Mexico, the survey does not contain information on the characteristics of beneficiary households.

**Table 7** SP coverage and total private transfers sent

Variable	SP eligible HH		SP ineligible HH	
	(1)	(2)	(3)	(4)
<i>OLS: amount of private transfers sent</i>				
SP coverage at the state level	10.92 (13.67)	18.48 (12.89)	-149.7* (82.30)	-157.6* (82.85)
<i>LPM: probability of sending private transfers</i>				
SP coverage at the state level	0.0231 (0.0227)	0.0301 (0.0251)	-0.0438 (0.0396)	-0.0293 (0.0428)
HH-level controls	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	No	Yes	No
State-level controls	Yes	Yes	Yes	Yes
Municipality fixed effects	No	Yes	No	Yes
Municipality-level controls	Yes	Yes	Yes	Yes
Observations	54,854	54,854	55,478	55,478

Source: Author's elaboration based on the ENIGH. HH-level controls include the variables presented in Table 2. State-level controls include the state population size and binary variables that indicate the political affiliation of the Governor. Municipality-level controls include government revenue, number of housing credits granted and number of workers affiliated to IMSS. Monetary figures are in real 2006 pesos. Standard errors are clustered at the state level

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

the other hand, it may be that households have different motives for remitting depending on whether they have access to a social security institution or not.

## 8 Conclusions

This study examined the empirical question of whether the implementation of Seguro Popular affected the amount of private transfers received and the likelihood of receiving private transfers among Mexico's uninsured households. The effects of Seguro Popular were identified using the spatial variation in the program's coverage induced by its sequential roll-out throughout Mexico.

Based on multiple waves of the ENIGH, the results show that among households eligible for the program Seguro Popular had no effect on the amount of private transfers received. This may be due to the fact that prior to the program's implementation in 2000, health expenditures only accounted for 2.6 % of total household expenditures. On the other hand, the implementation of Seguro Popular reduced on average a household's probability of receiving private transfers by 5.55 percentage points, a 28.6 % reduction with respect to the 0.194 probability that uninsured households had of receiving private transfers prior to the program's introduction in 2000. This estimate is driven by domestic private transfers, since international private transfers were not affected by the program's implementation at either the intensive or extensive margins. Seguro Popular's negative effect on the likelihood of receiving private transfers is robust to the use of the program's state-level expansion or municipality-level availability.

The fact that Seguro Popular had a clear social welfare improving effect has been well documented, since the program has provided millions of Mexicans access to health care. Nonetheless, the finding that an unintended consequence of Seguro Popular is that it partially crowds-out private support highlights the importance of looking at unexpected outcomes when analysing public policies, since the presence of crowding-out effects has important implications for the effectiveness of redistributive policies. The crowding-out effect suggests that the net effect of Seguro Popular is smaller than when just analysing its impact on health expenditures or health outcomes. Consequently, an evaluation of the effects of Seguro Popular should take into account possible changes in private behaviour. Failure to do so may overstate the program's potential benefits or distributional impacts.

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## Appendix

### Challenges to identification

This section examines if the identification strategy used in this study is valid. The test is relevant because using the expansion and availability of Seguro Popular as a source of identification assumes that these two factors are not correlated with the outcomes of interest. The endogeneity of Seguro Popular is examined by testing whether the program's quarter and year of introduction and expansion rates in 2005 and 2010 are predicted by pre-program municipality and state-level characteristics compiled from Mexico's 2000 Census.<sup>23</sup> The test is performed by estimating the following model by OLS:

$$y_m = X_m\beta + Z_s\delta + \varepsilon_m \quad (2)$$

where  $y_m$  denotes either the quarter and year of introduction of Seguro Popular in municipality  $m$ , expressed as an index equal to one beginning in the fourth quarter of 2002 which increases by one unit each quarter, or is a continuous variable between zero and one that indicates the proportion of the eligible population enrolled in Seguro Popular in municipality  $m$  in 2005 or 2010.  $X_m$  and  $Z_s$  are vectors of municipality- and state-level characteristics in 2000, respectively; and  $\varepsilon_m$  is the error term.<sup>24</sup> The municipality-level covariates included in Eq. (2) are population size, the share of insured population, the share of urban population, the median wage, the population's average years of schooling, the unemployment rate, and demographic and industry composition shares. The state-level regressors are population size, the political party of the Governor, and state dummies. Equation (2) also includes the share of households that receive international and domestic private transfers, the median of international and domestic private transfers received, and the average number of international migrants per household. The estimations are performed for all municipalities and for those municipalities included in the ENIGH.

The endogeneity analysis results are presented in Table 8. In column (1), the dependent variable is an index denoting the quarter and year of implementation of Seguro Popular. It can be seen that the municipality's date of entry into Seguro Popular is negatively related with its population size and positively related with the state's population size. Moreover, the date of entry is positively associated with the share of the population covered by a social security institution. Additionally, the

<sup>23</sup> The analysis performed in this subsection is conducted at the municipality level and not the state level given that performing it at the state level limits the sample to 32 observations. The small sample size implies that the estimated regressions would be unlikely to have sufficient power to adequately distinguish between zero and non-zero coefficients. Nevertheless, the estimation of Eq. (2) was also performed at the state level, where for all years none of the estimated controls were statistically significant; except for 2012, where the variable log median of domestic private transfers was significant at the 10.0 % level. These results are available upon request.

<sup>24</sup> A similar analysis is conducted by Azuara and Marinescu (2013) and Bosch and Campos-Vázquez (2014), who investigate whether the implementation of Seguro Popular affected participation rates in the formal-informal labour markets.

**Table 8** Determinants of SP date of entry and expansion by municipality

Variable	Date of entry (1)	Expansion 2005 (2)	Expansion 2010 (3)
Log population	-1.303*** (0.1720)	0.0025 (0.0100)	-0.0064 (0.0093)
Log state population	4.250*** (0.2960)	-0.0241 (0.0205)	-0.0075 (0.0208)
Share of insured population	3.780*** (1.269)	-0.1370 (0.0889)	0.0371 (0.0819)
Share of urban population	0.6660 (0.6540)	0.0243 (0.0543)	-0.0692 (0.0548)
Log median wage	0.8370 (0.5540)	-0.0517 (0.0516)	-0.1380*** (0.0509)
Unemployment rate	-10.81 (9.754)	0.8010 (0.6360)	1.022 (0.7590)
PRI Governor	-3.074*** (0.8050)	0.0242 (0.0788)	-0.0096 (0.0593)
PRD Governor	-0.7550 (1.469)	-0.4140*** (0.0674)	-0.0826 (0.0600)
Share of population under age 24	-7.431* (4.222)	0.0430 (0.2700)	0.1700 (0.2400)
Share of population between ages 24 and 40	-15.38* (8.597)	0.4290 (0.5520)	-0.8850 (0.5570)
Avg. number of international migrants per HH	1.139 (1.962)	0.0250 (0.1320)	0.1820 (0.1390)
Log median international private transfers	0.0463 (0.0880)	0.0104 (0.0080)	0.0030 (0.0055)
Log median domestic private transfers	-0.1230 (0.2580)	-0.0168 (0.0270)	0.0056 (0.0176)
Share of pop. that receives int. private transfers	-2.775 (9.886)	-1.048 (0.6900)	-0.0737 (0.7310)
Share of pop. that receives dom. private transfers	12.75 (10.27)	0.9480 (0.7260)	-0.1160 (0.6840)
Observations	1161	569	597

Source: Author's elaboration. In column (1) the dependent variable is an index beginning in the fourth quarter of 2002 that denotes the municipality's date of entry into SP, and includes all the municipalities in the ENIGH. In columns (2) and (3) the dependent variable is the proportion of eligible individuals covered by SP at the municipality level in 2005 and 2010, respectively, and include all the municipalities in the ENIGH in those years. Data on the number of eligible individuals were taken from the 2005 Population Count and the 2010 Census. Data on the number of individuals covered by SP were provided by the CNPSS. Explanatory variables are drawn from the 2000 Census. The regressions also include variables denoting average years of schooling and share of male population in the municipality, state dummies, and industry share dummies by municipality. Robust standard errors are in parentheses

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

**Table 9** OLS: SP coverage and total health expenditures

Variable	(1)	(2)	(3)	(4)	(5)
SP coverage at the state level	-116.6*** (16.31)	-105.5** (49.47)	-108.8** (51.25)	-99.91* (49.13)	-92.03* (49.43)
HH head age				5.107*** (0.6400)	5.116*** (0.5780)
HH head years of schooling				23.52*** (3.633)	23.46*** (3.381)
HH head male				28.50*** (10.32)	30.76*** (10.81)
HH enrolled in Prospera				-58.78*** (8.528)	-50.33*** (8.693)
HH members under age 12				17.74*** (2.993)	18.33*** (2.921)
HH members age 65 and older				61.79*** (21.95)	63.08*** (22.21)
Good quality walls in the HH				7.329 (9.164)	5.388 (9.971)
Good quality roofs in the HH				52.31*** (8.378)	52.96*** (8.486)
Good quality floors in the HH				38.83*** (12.55)	19.35 (11.43)
Rural locality				14.16 (8.581)	-9.466 (18.96)
Year fixed effects	No	Yes	Yes	Yes	Yes
State fixed effects	No	Yes	No	Yes	No
State-level controls	No	No	No	Yes	Yes
Municipality fixed effects	No	No	Yes	No	Yes
Municipality-level controls	No	No	No	Yes	Yes
Observations	62,882	62,882	62,882	62,882	62,882

Source: Author's elaboration based on the ENIGH. HH denotes households. State-level controls include the state population size and binary variables that indicate the political affiliation of the Governor. Municipality-level controls include government revenue, number of housing credits granted and number of workers affiliated to IMSS. Monetary figures are in real 2006 pesos. Standard errors are clustered at the state level

**Table 10** SP coverage and private transfers. Different effects by year

Year	OLS: amount of private transfers received		LPM: probability of receiving private transfers	
	(1)	(2)	(3)	(4)
SP * 2004	-54.11 (176.7)	38.44 (161.1)	-0.0728 (0.0467)	-0.0691 (0.0429)
SP * 2005	-49.06 (91.21)	43.41 (94.86)	-0.0736** (0.0315)	-0.0592** (0.0289)
SP * 2006	-103.6 (140.3)	15.05 (144.2)	-0.0530 (0.0405)	-0.0383 (0.0385)
SP * 2008	-212.9 (215.0)	-240.5 (210.6)	-0.0452 (0.0591)	-0.0825 (0.0532)
SP * 2010	-254.8 (153.7)	-264.5* (151.4)	-0.0240 (0.0505)	-0.0350 (0.0412)
SP * 2012	159.8 (178.0)	75.19 (178.7)	0.0008 (0.2000)	0.0292 (0.2060)
HH-level controls	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	No	Yes	No
State-level controls	Yes	Yes	Yes	Yes
Municipality fixed effects	No	Yes	No	Yes
Municipality-level controls	Yes	Yes	Yes	Yes
Observations	54,854	54,854	54,854	54,854

Source: Author's elaboration based on the ENIGH. Figures presented represent coefficient estimates for SP coverage at the state level. HH-level controls include the variables presented in Table 2. State-level controls include the state population size and binary variables that indicate the political affiliation of the Governor. Municipality-level controls include government revenue, number of housing credits granted and number of workers affiliated to IMSS. Monetary figures are in real 2006 pesos. Standard errors are clustered at the state level

date of entry is negatively related with having a Governor from the PRI party and with demographic variables pertaining to the share of the population under the age of 24 and between the ages of 24 and 40. Above all, the municipality's initial quarter and year of participation in Seguro Popular is not associated with any of the study's main outcomes of interest.

Columns (2) and (3) in Table 8 present regression results where the dependent variable is the proportion of eligible individuals covered by Seguro Popular at the municipality level in 2005 and 2010, respectively. It is observed that the expansion is not related to the municipality's population size or to the state's population size. Although not significant, the negative signs of the state population variable are in line with the arguments put forward by Díaz-Cayeros et al. (2006) and Bosch and Campos-Vázquez (2014). The scholars claim that prior to the 2006 presidential election, smaller states were given preference to achieve full coverage so that the federal government could declare that it had achieved universal coverage in these states. Municipalities with low median wages also had lower expansion rates in 2010. It could be that poorer municipalities which have lower median wages have a scarcity of health facilities which are a requirement for implementing Seguro Popular. Furthermore, the expansion of Seguro Popular in 2005 was slower in states governed by the PRD left-wing party, the main opposition of the ruling right-wing PAN party. With respect to the variables of interest, as in column (1), the expansion of Seguro Popular in 2005 and 2010 is not correlated with the average number of international migrants per household, the log medians of international or domestic private transfers, or the shares of the population that receive international or domestic private transfers.

While the implementation of Seguro Popular was not completely exogenous, Table 8 does not provide evidence suggesting that the program was targeted in specific municipalities in relation to the outcomes of interest, since they have no effect on the date of entry or on the expansion of Seguro Popular.<sup>25</sup> In summary, the results support the identification strategy used in this study. Nevertheless, the fact that there was no randomisation in the implementation of Seguro Popular implies that it is not possible to rule out the potential existence of other treats to the identification of the program's effects. This represents an important limitation of the study.

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<sup>25</sup> Estimations of Eq. (2) using more flexible specifications were also performed. These included incorporating non-linearities and interactions between municipality and state-level controls, among others. The results were generally similar to those reported in Table 8.



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