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Taking Cover: Human Capital Accumulation in the Presence of Shocks and Health Insurance

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Non-Technical Summary

This paper aims to assess the capacity of universal healthcare in mitigating the negative effect of environmental shocks on children's performance in school.

I use the expansion of a governmental scheme to extend social healthcare to the uninsured population in Mexico (Seguro Popular) and a nationwide evaluation of academic performance among primary school children. Results show that the experience of negative rainfall shocks reduce test scores of children in school. However, the implementation of universal healthcare in the country built resilience in academic achievement during adverse rainfall shocks (with estimated effects concentrated in more marginalized and rural areas).

A study of the role of health insurance in protecting children's cognitive achievement shows a reduced incidence of sickness among children, lower demand for their time, and higher stability in household consumption among program-eligible families exposed to rainfall shocks.

The findings contribute to and are in line with recent studies evaluating the extent to which different programs can mitigate the negative effect of climatic and other environmental shocks on human capital (including cash transfers and nutrition programs). While most of the previous studies have focused on the role of health insurance in fostering education in advanced economies and have limited the analysis to a sub-sample of households, I show the effect of healthcare coverage in a context of high regional imbalances using a nationwide policy to implement universal health coverage.

Since adverse rainfall shocks are one of the most prevalent disturbances experienced among the poor, the results of this study are highly relevant to a large share of the population of the world. The findings presented here are also relevant amid the growing number of countries expanding healthcare coverage and should be considered when carrying out a cost-benefit analysis of public investments in health.

Taking Cover: Human Capital Accumulation in the Presence of Shocks and Health Insurance

Paulino Font-Gilabert*

December, 2020

Abstract

Using the expansion of a large-scale health insurance program in Mexico and variation in local rainfall levels, I estimate whether the program-induced increase in healthcare coverage protected the educational attainment of primary school children in the event of adverse climatic shocks. Results show that the universalization of healthcare mitigated the negative effect of atypical rainfall on test scores, particularly in more marginalized and rural areas. An analysis of the mechanisms at play shows a reduced incidence of sickness among children, lower demand for their time, and higher stability in household consumption among program-eligible families exposed to rainfall shocks.

Keywords: climate resilience, academic achievement, health insurance, Seguro Popular, Mexico

JEL: I13, I15, I25, O12

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1 Introduction

In the past decades, the education level of the world's population has experienced a remarkable and sustained increase (Lee and Lee, 2016). This has also been the case for low and middle-income countries, for which the number of out-of-school children has been steadily decreasing amidst the push to achieve universal primary and secondary education (UIS, 2018). However, an alarming number of children attending school perform poorly in cognitive assessments, large disparities in cognitive achievement both across countries and population groups persist, and current learning gaps are closing at a sluggish pace (Hanushek, 2013; UIS, 2017).

With the improvements in schooling, the international community has moved the attention towards its quality. However, although schools and the teaching they provide play a critical role in the cognitive development of children (Araujo et al., 2016; Dearden et al., 2002; Deming et al., 2014), quality alone cannot provide an exhaustive explanation of what is being considered a global learning crisis. There exist other important and complementary inputs in the education production function over which families have a closer control and that explain a substantial part of the variation observed in cognition levels, including time, monetary, and health investments in children (see Currie and Almond (2011); and Almond et al. (2018) for a review of the studies). Moreover families (especially in low-income areas), are often exposed to shocks, and negative disturbances affecting family means might result in interruptions in children's cognitive development.

Whether shocks impact children's human capital, however, depend on the ability and coping mechanisms households have access to (Almond et al., 2018; Frankenberg and Thomas, 2017). This study seeks to investigate the extent to which access to public health insurance, a form of safety net, is able to protect children's performance in school during adversity. I define shocks as atypical rainfall levels and use the expansion of a large-scale pro-poor health insurance program in Mexico that sought to extend access to public healthcare to the uninsured (estimated to be around half of the population at the program start). The reasons why adverse rainfall might impact learning include its effect on health and the disease environment (Aguilar and Vicarelli, 2011; Bleakley, 2010; Colón-González et al., 2013; Duque et al., 2019; Maccini and Yang, 2009; Rocha and Soares, 2015; Rosales, 2014; Wu et al., 2015), on income, food security, and the opportunity cost of schooling (Amare et al., 2018; Gabrysch et al., 2018; Shah and Steinberg, 2017; Skoufias and Vinha, 2013), on mental distress (OBrien et al., 2014; Rataj et al., 2016), and more broadly on economic and political stability (Barrios et al., 2010; Hsiang et al., 2013; Miguel et al., 2004).

On the other hand, healthcare coverage has been linked to higher endowment levels at birth (Bhalotra et al., 2019), lower incidence of sickness and preventable hospitalizations (Currie et al., 2008; Miller and Wherry, 2019), better mental health (Finkelstein et al., 2012), and higher levels of education attained (Brown et al., 2015; Cohodes et al., 2016; Levine and Schanzenbach, 2009; Miller and Wherry, 2019; Wherry et al., 2016). Moreover, studies have shown an association between financial protection in health and a lower probability of suffering catastrophic and impoverishing health expenditures (Gross and Notowidigdo, 2011; Wherry et al., 2016), and higher levels of consumption through a reduction in precautionary savings (Gruber and Yelowitz, 1999; Maynard and Qiu, 2009).

The health insurance program under study is Seguro Popular (or Popular Health Insurance, hereafter also referred to as SP). The SP was the result of a reform of the Mexican health system in response to a political debate after national estimates showed that more than 50% of the health expenditures in the country were out of pocket, with 2 to 4 million families estimated to be suffering from catastrophic and impoverishing health expenditures each year (Knaul et al., 2006). Starting in 2002 as a pilot program, it offered a comprehensive package of health services to individuals outside of the social security system and, after ten years of program expansion and more than 52 million new affiliations, it achieved its target of establishing universal healthcare.

In this study I analyze the capacity of universal healthcare in protecting the cognitive development of children in the event of negative shocks. To do so, I combine information from a yearly nationwide standardized test delivered to all students in certain grades in primary education, the expansion in health coverage induced by the reform of the health system and the creation of Seguro Popular, and rainfall precipitation measured at the school-locality level in a region where climatic conditions are influenced by El Niño/Southern Oscillation (ENSO)[1].

[1]An irregular climatic phenomenon that has been shown to affect precipitation levels in Mexico.

The results show that while adverse rainfall shocks reduce mathematics and verbal attainment by 0.022 and 0.020 standard deviations respectively, a one standard deviation increase in healthcare coverage mitigates 55% and 52% of the negative effect.[2] The estimated results are driven by schools located in more marginalized and rural areas. Moreover, the impact of the shocks differs by intensity and nature, with dry periods imposing a higher burden on the process of learning and during which health coverage offsets the highest proportion of the adverse effect. On the other hand, robustness specifications suggest a null impact of health coverage on cognitive attainment in the absence of shocks.

An exploration of the underlying mechanisms using household survey data shows that when hit by rainfall shocks, access to SP reduces the incidence of sickness among children from eligible families, decreases the demand for children's time, and protects household's consumption levels. While negative rainfall shocks increase by 6.6 percentage points the probability of children being sick, and by 14.1 percentage points their probability of being involved in domestic chores, each additional year of SP eligibility reduces these probabilities by 1.5 and 3.5 percentage points respectively (significant at the 5% level). Similarly, rainfall shocks are associated with a reduction of 16% in consumption expenditures among program-eligible households (18% in rural households and similar to the 16.7% reduction estimated by Bobonis (2009) for a sample of rural households in Mexico). Each additional year of SP availability, however, reduces by 4% (3%) the negative effect.

Overall, the story that emerges from the findings is one of positive spillovers on education from public investments in health. It provides evidence of the capacity of universal healthcare in building resilience in cognitive attainment against negative shocks experienced during childhood, and contributes to our understanding of some of the mechanisms at play. The results contribute to and are in line with recent studies evaluating the extent to which different programs can mitigate the negative effect of climatic and other environmental shocks on human capital. For instance, conditional cash transfers ease the negative effect of rainfall shocks on educational attainment in Mexico (Adhvaryu et al., 2018) and Colombia (Duque

[2] The effect of rainfall shocks on mathematics test scores is equivalent to erasing more than one-fourth of the gains from interventions that provide instructional materials, or more than one-sixth of the gains from teacher training programs (see McEwan (2015) for a review of randomized educational experiments in developing countries).

et al., 2019), vitamin A supplementation at-birth reduces the adverse effects of exposure to a tornado on infant health in Bangladesh (Gunnsteinsson et al., 2019), a rural employment scheme in India mitigates the impact of heatwaves on children's cognition (Garg et al., 2017), public health improvements in West Africa weaken the link between dust storms and child mortality (Adhvaryu et al., 2019), and the introduction of air conditioning in schools alleviates the effect of heat exposure on test scores in the US (Park et al., 2020).

This study also speaks to the literature evaluating the effect of healthcare coverage on children's educational outcomes. While most of the previous studies have focused on the role of health insurance in fostering education in advanced economies and have limited the analysis to a sub-sample of households, I estimate the effect of healthcare coverage in a context of high regional imbalances and exploit a nationwide policy to implement universal health coverage.[3] One other study has attempted to evaluate the link between health insurance and education in Mexico (Alcaraz et al., 2016), finding a positive association between healthcare coverage, school enrolment, and educational performance at the municipality level. I expand on previous findings by assessing the capacity of healthcare coverage in building resilience in children's performance in school, and by investigating some of the mechanisms by which universal healthcare might help children and their families endure adverse environmental shocks. This study is similar in spirit as Liu (2016), who using survey data shows that the expansion in health coverage across rural China increased the probability of children being enrolled in school following a household health shock. To avoid the potential endogeneity of health shocks and risk-sharing networks among neighboring households, I focus on climatic shocks experienced at the locality level, and focus on children's performance in school (instead of enrollment) using administrative data.

Because adverse rainfall shocks are one of the most prevalent disturbances experienced among the poor (Dinkelman, 2013), the results of this study are highly relevant to a large share of the population of the world. Climate instability has consolidated as one of the major threats to developmental gains, including gains in human capital, and there is international consensus to develop and implement policies that mitigate its negative effects on the popu-

[3] Most of the evidence comes from the Medicaid program and the CHIP (Children's Health Insurance Program) in the US, which target families and children in poverty and under specific vulnerable conditions.

lation (Field et al., 2012). Universal health coverage has recently evidenced its potential to protect the world's population against global health shocks (Aarabi et al., 2020). The WHO pushes for its expansion as a major goal for health reform (WHO and World Bank, 2017, 2020), and many countries across the world are increasing access to social health insurance among the disadvantaged population (Boerma et al., 2014; Marten et al., 2014; Reich et al., 2016). To the best of my knowledge, this is the first study to assess the capacity of universal healthcare in mitigating the effect of negative shocks on children's cognitive performance.

The rest of the paper is organized as follows. Section 2 introduces the social health insurance expansion in Mexico. Section 3 describes the academic, climate, affiliation to Seguro Popular, and household survey data. The empirical strategy is discussed in section 4, and the results follow in section 5. I conduct a series of robustness checks in Section 6. Finally, Section 7 explores the mechanisms at play and Section 8 concludes.

2 Seguro Popular: health insurance for the poor

Before the creation of Seguro Popular, social health insurance was administered by two main institutions that still exist today. On the one hand, the Mexican Social Security Institute (IMSS), covering the workers of the private sector; and the Institute for Social Security and Services for State Workers (ISSSTE), covering public employees.[4,5]

Those families not integrated into any of the former institutions could seek healthcare assistance through the conditional cash transfer program and main anti-poverty program in the country (Progresa/Oportunidades), or in the Coverage Expansion Program (PAC), which consisted of mobile healthcare teams visiting the most isolated regions and communities in the country.[6] All other workers in the informal sector and individuals detached from the labor market could seek medical care in either health facilities managed by the Ministry of Health (SSA) or in the private sector. In both cases, medical attention and prescription drugs

[4]Also playing a more marginal role, the Mexican Petroleums (PEMEX), covering workers in the oil industries.

[5]These institutions also administered other benefits such as pensions, disability benefits, and severance payments.

[6]The Progresa program started in 1997 in rural areas and was renamed Oportunidades in 2002 when it expanded to urban areas. In 2014 the program's name changed to Prospera. The Coverage Expansion Program or Programa de Ampliación de Cobertura (PAC) started in 1996.

were at the expense of the user. As a result, the health system left half of the population uninsured. While Mexico ranked 51 out of 191 countries in the overall attainment in health in the World Health Report 2000, its health system placed 144 with respect to its fairness in financial contribution (WHO, 2000). National-level estimates showed that more than 50% of the health expenditures were out of pocket and that between 2 to 4 million families suffered from catastrophic and impoverishing health expenditures each year (Knaul et al., 2006).

The low levels of financial protection in health were one of the major catalysts for the creation of Seguro Popular, which was introduced in 2002 as a pilot program and became the central pillar of the reform of the health system of 2003. The new law, effective from January 1st, 2004, created the System of Social Protection in Health (or SPSS in its acronym in Spanish) to provide health coverage and financial protection in health to all citizens with no access to social security and to consolidate universal health care and the right to health (Knaul et al., 2006).[7,8] The services offered, listed in the Universal Catalog of Health Services (CAUSES), expanded as the program consolidated across the territory, and included the most cost-effective health interventions and the leading causes for outpatient and hospital utilization in the country (Bonilla-Chacín and Aguilera, 2013).

The health reform also sought to increase the funds of the public health system and to reduce the inequalities in public health spending across insurance schemes and regions (Kurowski et al., 2012). See also Figures 1 and 2. The push for universal healthcare resulted in the construction of new patient clinics and hospitals, with the proportion of the Ministry of Health budget devoted to investments in healthcare infrastructure increasing from 3.8% in 2000 to 9.1% in 2006 (Frenk et al., 2009). Moreover, the gap in the availability of medical personnel between individuals covered by the Social Security and those that were not decreased substantially (Knaul et al., 2012), as did the difference in the number of hospitals and beds between poor and rich municipalities (Conti and Ginja, 2017).

The financial resources of SP come mostly from the federal government and the states.[9]

[7] The self-employed, the underemployed, the unemployed, those detached from the labor market, and their families.

[8] The requirements to enroll in SP are proof of residence, Mexican ID, and lack of access to health insurance.

[9] The contributions to SP from the states are a subsidy in nature. These are set as a fraction of the total expected cost in health services per capita (which vary by state) adjusted by differentials in regional wages, and capped at a maximum of 30% of the total per-family expected cost.

Although initially only families in the first two deciles of the income distribution were exempt from any payments, in practice very few households ever paid (Knaul et al., 2012).[10] Furthermore, the reform introduced incentives for the states to expand coverage, as historical health budget allocations were replaced with a premium based on the number of affiliates (Bonilla-Chacín and Aguilera, 2013).[11] In 2012 and after having enrolled 52.6 million individuals, Mexico achieved universal health coverage.

3 Data

This study combines an extensive array of publicly available information obtained from different institutions, all described in greater detail below.

School and academic performance

I measure educational achievement with a yearly national standardized test: the National Evaluation of Academic Achievement in Schools (or ENLACE in its acronym in Spanish). Since its implementation in 2006 the test evaluates the mathematical and verbal abilities of students in grades 3 to 6 in primary education and 7 to 9 in lower secondary education.[12] The data are available from Mexico's Ministry of Education (SEP), with school results disaggregated by grade and subject. In this study I focus on the evaluation of schools in primary education, for which I can obtain disaggregated results by grade and subject for all the years in which the test was implemented (2006-2013).[13] The information provided includes test score results in the different subjects under evaluation, the distribution of students falling in different categories of proficiency: inadequate, fair, good, or excellent results[14]; the number of

[10] Knaul et al. (2006) show that by the end of 2011 only 1% of the families were paying the family premium.

[11] Previously, the states' budget for the health system was based on their infrastructure and health care personnel in the late 1990s adjusted for inflation and mortality levels (Bonilla-Chacín and Aguilera, 2013).

[12] From 2008 the test also evaluates competencies in a third subject that rotates on a yearly basis: Natural Sciences in 2008, Civics and Ethics in 2009, History in 2010, Geography in 2011, Science in 2012, and Civics and Ethics again in 2013.

[13] The ENLACE was replaced by another standardized test (PLANEA), which was then canceled in 2019 due to budget constraints.

[14] The definition of each of these categories is as follows: inadequate, the student needs to acquire the knowledge and develop the relevant skills of the subject assessed; fair, the student needs to strengthen most of the knowledge and develop the relevant skills; good, the student shows an adequate level of knowledge and has the relevant skills; excellent, the student masters the knowledge and the skills of the subject evaluated.

students sitting the test, the number of students considered to have been involved in copying, dictating answers, or other fraudulent practices, and the level of marginalization experienced in the school's location.[15] The evaluation date is scheduled in advance of the start of the academic year, and the test is simultaneously administered to all schools during the national evaluation week (typically towards the end of the school year).[16]

I complement these data with school information held in the Estadística 911 (Statistic 911). The 911 is an administrative questionnaire that all schools in Mexico are required to fill at the beginning and the end of the school year, detailing information on students, teachers, and other school characteristics. With the information provided I calculate the number of students per teacher, the share of female pupils, and the dropout rate (the proportion of students that left the school throughout the academic year), all for the grades evaluated in ENLACE. Also, I create an indicator for whether the head of the school has teaching responsibilities.

Table 1 shows that around 20% of the pupils in each school do not achieve minimum levels of proficiency in both the mathematics and verbal section of ENLACE, with around half of the students obtaining just a pass (see Appendix Figure A.1 for a more detailed distribution of the test results). On average, there are no sex imbalances in the classroom (49% of students are female), and there are 26 students per teacher in the sample of schools. In 29% of the schools the head also teaches, and 137 is the number of students evaluated yearly in each school. Moreover, around 40% of the schools are experiencing some degree of marginalization (but only 4% are in very high marginalized areas).

During the study period three different school-level programs could have influenced school performance in Mexico: the PES (Programa de Escuela Segura) or Safe School Program, promoting an inclusive and peaceful environment in schools for effective learning; the PETC (Programa Escuelas de Tiempo Completo) or Extending School Hours Program, extending

[15]The census authorities in Mexico create and maintain a marginalization index that reflects the different levels of development observed throughout the country and at different administration levels. At the smallest regional disaggregation (AGEB or Basic Geostatistical Area), it is calculated with different measures related to education and literacy, access to services, child mortality, and the quality of housing, depending on whether it is an urban or a rural location.

[16]More specifically, the test was administered from the 5th to the 9th of June in 2006, 23rd to the 27th of April in 2007, 14th to the 18th of April in 2008, 23rd to the 29th of April in 2009, 19th to the 23rd of April in 2010, 23rd to the 27th of May in 2011, 4th to the 8th of June in 2012, and 3rd to the 7th of June in 2013.

the school day to expand learning opportunities and strengthen the development of the curriculum; and the PEC (Programa Escuelas de Calidad) or Quality Schools Program, a program involving schools and their communities in resolving issues preventing schools from offering better educational services. The list of schools participating in these programs in each academic year is obtained from the Ministry of Education. Table 1 shows that the Quality Schools program was the most expanded (implemented in 26% of the schools), followed by the Safe School program (present in 17% of the schools), and the Extending School Hours program (implemented in only 2% of the schools).

To derive the geolocation of the schools I use the 2013 school census, provided by INEGI (the National Institute of Statistics and Geography), the Statistics 911, and the ENLACE evaluation. The geographic information that all three sources provide is the state, municipality, and locality code in which the school is located (following the Unique Catalogue of Geostatistical State, Municipal, and Local Areas). With this information, I match each school to its respective locality.[17,18] The final sample excludes those schools with inconsistent geographic information and in the top percentile of the share of students considered to have cheated during the test.[19] Moreover, I restrict the analysis to those schools observed in all periods, and with 15 or more students evaluated. After applying this filter, the sample consists of 49,751 schools, observed uninterruptedly for 8 years.

Health insurance coverage

Administrative records on affiliation to Seguro Popular are provided by the Ministry of Health (SSA), containing the number of affiliates to the program by municipality and quarter.[20] I measure the expansion of SP across the country by dividing the number of beneficiaries in a municipality by its population size. Yearly population at the municipality level is calculated

[17]Although the ENLACE evaluation provides information to track the localities in which the schools are based, the information is not always consistent across all years (in part due to changes in the coding system). Therefore, I prefer to use the school census of 2013 to infer the geographical location of schools, and in the few occasions that this one is missing, infer it from the Statistics 911 and the ENLACE evaluation when the codes provided are consistent across all evaluation years.

[18]A locality in Mexico refers to the lowest of the three sub-national divisions contemplated by the law.

[19]Equivalent to excluding those schools where more than 58% of students have invalid test results.

[20]A municipality in Mexico refers to the second-level administrative division of the country, and it is equivalent to a county in the US.

assuming linear growth between the two census years of 2005 and 2010, and with projections of municipality population estimated by the National Population Council (CONAPO) after 2010. Figure 3 displays the evolution of the affiliation to SP and its coverage at the national level. It shows that by 2013 the program was covering almost half of the Mexican population with 55 million beneficiaries. Figure 4 displays the regional expansion of the coverage rate. In the sample of schools, the average coverage rate during the study period is around 34%, and the average observed expansion is 36.3 percentage points (standard deviation of 17.3) (Table 1).

In addition to the coverage rate, I calculate the start date of the program in each municipality. Following previous studies (Bosch and Campos-Vazquez, 2014), I define the quarter of program implementation as when at least 10 individuals enroll in SP.[21] With this definition, Appendix Figure A.2 and A.4 display the timing and the pace at which municipalities joined the program. As Appendix Figure A.4 shows, most of the municipalities had already joined the program by 2008.

Rainfall shocks

I use rainfall data from the National Oceanic and Atmospheric Administration (NOAA). They offer monthly hydrometeorology information from 1950 to 2013 for all the North America in grid cells of approximately 6 km width (1/16°). The dataset improves on previously available information in the reduction of transboundary discontinuities and with an adjustment of orographic precipitations in Mexico (see Livneh et al. (2015) for a more detailed discussion). I measure monthly precipitations at the school-locality level by constructing a linear distance weighted rainfall variable using all the data points located within a 20 km radius of each locality centroid. The baseline specification defines the existence of a rainfall shock when the precipitations gathered in a given locality in the 12 months preceding the academic evaluation are below or above 1 standard deviation from the historical regional mean. However, I further explore heterogeneity in shock intensity and differentiate between rain excess and rain shortage. With the use of a relative instead of an absolute measure of rainfall I make

[21] The reason being is that some of the municipalities, especially at the beginning of the program, show a very low affiliation (zero or close to zero) for several quarters, making it difficult to infer whether the program was operational during that period.

sure that I am not comparing localities that are more prone to gather higher levels of rainfall with localities that typically receive much less rain. Instead, the measure captures the effect of locality-specific departures from their normal precipitation levels. This definition of rainfall shock has shown to best explain the evolution of agricultural income in Mexico (Adhvaryu et al., 2018; Bobonis, 2009). Figure 5 displays the geographical distribution of rainfall shocks with the previous definition for the state of Puebla in 2006 and for localities with at least one school in the final sample. Triangles depict periods when the rainfall gathered in a locality exceeded in 1 standard deviation the historical regional rainfall mean (rain excess), crosses represent rainfall levels below 1 standard deviation from the historical records (rain shortage), and grey dots represent stable precipitations. Rainfall variation in Mexico is partly affected by the country falling under the influence of El Niño-Southern Oscillation (ENSO). This climatic phenomenon, which causes irregular fluctuations in the temperature of the sea surface, alters precipitations in the country differently by region and phase of the cycle (Magana et al., 2003).[22] Appendix Figure A.5 shows the evolution in the probability of ENSO-induced climate alterations in the past years.

MxFLS (Mexican Family Life Survey)

To inspect the potential mechanisms by which availability of health insurance might interact with shocks and educational achievement I draw on the Mexican Family Life Survey (MxFLS). The MxFLS is a multi-thematic longitudinal household survey representative of the Mexican population at the national, urban, rural, and regional level, interviewing around 8,400 households in 150 locations (Rubalcava and Teruel, 2006, 2013). Relevant to this study, the survey gathers information relating to children's health, time use, household economic resources, and availability and access to health insurance. I focus the analysis on the children aged 6 to 14 during the third wave of the survey (carried between 2009 and 2011). Table 2 shows summary statistics of the children and their families. On average, children are 10 years old and have had access to Seguro Popular in their municipality of residence (conditional on eligibility) for 4.6 years (standard deviation of 1.66 years). School enrolment is high (with

[22] ENSO fluctuations can be divided by El Niño, periods with above-average temperature in the sea surface; and La Niña, periods with sea surface temperature below the average.

96% of children attending school), and the incidence of child labor is low (only 3% work for pay, 3% work in agriculture, and 1% work in the family business). On the other hand, the share of children with other household responsibilities is high, which include domestic chores (56%), and caring for elder, sick members in the household, or other children (16%).

Other

Information on health facilities and medical personnel, on the share of eligible individuals at the program start, on pre-program indicators relating to primary education (pass rate and completion rate), and on the marginalization level of municipalities is obtained from SIMBAD (State and Municipal Database System). Also, I compute a measure of regional political alignment with state and municipal election results with data from CIDAC (Development Research Centre). I use these variables to analyze the determinants of the rollout of the SP health insurance program across the country, discussed in greater detail in Section 6.

4 Empirical strategy

To identify the extent to which health insurance can mitigate the impact of rainfall shocks on children's educational performance I exploit rainfall disturbances in the school-locality and the expansion of Seguro Popular (SP) across municipalities. The large scale of the program required a gradual implementation of SP across the country, subject to financial resources and health infrastructure availability. Using the share of the population covered at a given point in time in a municipality I estimate the following equation:

$$y_{slmt} = \beta_1 R_{lmt} + \beta_2 SP_{mt} + \beta_3 SP_{mt} R_{lmt} + \alpha' Z_{slmt} + \zeta' X_{mt} + \delta_t \mu_r + a_s + \epsilon_{slmt} \qquad (1)$$

Where y_{slmt} are the evaluation results of primary school s in locality l of municipality m during the school year t, R_{lmt} is a rainfall shock dummy that equals one when precipitation gathered in the school-locality during the 12 months preceding the academic evaluation is above or below one standard deviation from the regional historical mean, SP_{mt} is the coverage rate of Seguro Popular in municipality m measured at the end of the year in which the academic year started[23], and $SP_{mt}R_{lmt}$ is the interaction of the two terms. The equation also includes a vector of school characteristics Z_{slmt} to control for the ratio of students per teacher, the share of girls, whether the school principal has teaching duties, the marginalization level of the school area[24], three dummy variables indicating whether the school participates in educational programs in year t (i.e., Safe School, Extending School Hours, or Quality School program), and the share of students marked as carrying fraudulent practices during the test. X_{mt} is a vector of covariates including population size[25], the homicide rate, and the transfers per capita from the Oportunidades/Progresa program[26] at the municipality level. The regression further includes state-year fixed effects $\delta_t\mu_r$ to account for yearly disturbances common to all schools in a given state, and school fixed effects a_s, which capture time-invariant characteristics of the school, its location, and the environment.[27]

The coefficients of interest are β_1 and β_3; the impact of rainfall shocks on school performance and the capacity of social healthcare to mitigate this effect. I focus on the intensive instead of the extensive margin in health coverage because the school test scores data are only available from the academic year 2005/06, and SP rollout began in year 2002. While I observe most of the expansion in the SP coverage rate, there are no pre-SP school data for most schools. However, the share of population covered by SP in a municipality is subject to endogeneity. While school and state-year fixed effects might capture a lot of the relevant heterogeneity in SP expansion and school performance, β_2 (the effect of health insurance on test scores during years of stable precipitations) is likely not identified. The SP coverage rate is therefore introduced in the regression as a control, and I focus the discussion on the estimates of β_1 and β_3. To interpret the effect of β_2 as causal one would need to assume that conditional on school and state-year fixed effects, the availability and expansion of SP was orthogonal to the evolution of academic performance. Although there could have been

[23]For example, for the academic year 2005/06, the healthcare coverage rate used is the one observed at the end of 2005.

[24]In five categories: very low, low, medium, high, and very high marginalization.

[25]Divided into seven categories: i) less than 5k, ii) between 5k and 20k, iii) between 20k and 50k, iv) between 50k and 100k, v) between 100k and 200k, vi) between 200k and 500k, and vii) higher than 500k.

[26]The Mexican conditional cash transfer program for education.

[27]There are 30 states represented in the sample (out of 32 in the country) and 1,696 municipalities (out of a total of 2,463). The sample totals an average of 107.6 municipalities per state (standard deviation of 67.5), and 35.9 localities per municipality (standard deviation of 31.2). Municipalities are at the second administrative division level in Mexico, and localities at the lowest of the three sub-national divisions.

political interests in implementing the newly created health insurance program earlier in regions that were seeing an improvement in their health levels, it is less likely that SP rollout responded to educational performance.[28] Section 6 explores the determinants of the timing and expansion of SP and conducts some robustness tests to shed more light on this issue.

Moreover, the reduced form estimates will capture potential spillovers to the untreated population (not eligible for SP). These spillovers could be positive if there are positive externalities from improved overall levels of the health and disease environment, or negative, if the increase in the demand for health services is not matched with an equal increase in the health infrastructure, leading to crowding of healthcare services.[29]

5 Results

5.1 Basic specification

Does health insurance mitigate the effect of negative rainfall shocks on educational achievement? Tables 3 and 4 show the results of estimating equation (1). Column 1 displays the results with test scores as the dependent variable, while columns 2 to 4 show estimates of the effect on the distribution of test achievement. Column 1 of Table 3 shows that students experiencing a negative rainfall shock during the academic year score 0.022 standard deviations lower in the mathematics test, and this reduction is significant at the 1% level. However, an increase of 10 pp in the health coverage rate mitigates the negative effect by 0.007 standard deviations (32% of the effect). A closer look at the distribution of test results shows that the share of students failing the evaluation (inadequate performance) increases by 0.65 pp in the event of a rainfall shock (column 2), with a 10 pp increase in health coverage reducing the effect by 0.21 pp (both estimates significant at the 1%). The results show a positive and significant correlation between the expansion of health insurance and mathematics test results (of 0.020 standard deviations from a 10 pp increase in health coverage), with stronger

[28]Nevertheless, Conti and Ginja (2017) show that the expansion of SP was not associated with pre-trends in child mortality.

[29]At least, Conti and Ginja (2017) show that the gap in terms of healthcare facilities and medical personnel was reduced between individuals covered and not covered by the Social Security, as a result of a higher increase in health care infrastructure in SSA centers (managed by the Health Ministry and responsible for the provision of Seguro Popular), than in non-SSA centers.

associations at the bottom of the test score distribution (see columns 2 to 4). Regarding the effect of other school characteristics, both a higher number of students per teacher and having a school principal with teaching responsibilities are correlated with lower performance. On the contrary, a higher share of girls in the classroom and participating in the school programs Extended School Hours and Quality Schools are positively correlated with higher test score results in mathematics.

Table 4 shows the results for the verbal test. The experience of a rainfall shock has a smaller impact in the verbal section of the evaluation (-0.020 standard deviations, column 1), with a 10 pp increase in the SP coverage rate mitigating in 0.006 standard deviations the negative effect (both magnitudes significant at the 1% level).

5.2 Direction and intensity of shocks

The basic specification defined the occurrence of a shock when local precipitations deviate by one standard deviation from the historical regional mean. Now, I introduce flexibility in the specification by allowing for a) different effects by the intensity level of the shock, and b) differential impacts by the nature of the shock – differentiating between periods with an excess of rainfall from periods characterized by rainfall shortage. Appendix Tables A.1 and A.2 divide rainfall shocks in three intensity categories: between 1 and 2 standard deviations away from normal precipitations, between 2 and 3 standard deviations, and 3 or more standard deviations. As expected, more extreme climatic conditions, that will more likely resemble floods and droughts, have larger impacts on test scores. While the reduction in the students' mathematics achievement is of the order of 0.015 standard deviations in the event of milder shocks (precipitations between 1 and 2 standard deviations), the occurrence of severe shocks (precipitations above or below 3 standard deviations) reduce the mathematics' achievement score by 0.15 standard deviations and increase the test failure rate by 4 pp (significant at the 1% level) (columns 1 and 2 of Table A.1). However, a 10 pp increase in health coverage absorbs 33% of the effect of mild shocks on mathematics test scores, and 22% of the effect during severe shocks (significant at the 1% level) (column 1, Table A.1). In the verbal section (Table A.2), milder shocks lower the attainment score by 0.014 standard deviations (column 1). In comparison, greater adverse shocks reduce by 0.11 standard deviations the verbal mark, with a 10 pp increase in health coverage offsetting by 24% the negative effect (both magnitudes significant at the 1% level).

Appendix Table A.3 shows the results of dividing climate shocks by excess and shortage of rainfall. The results show that while experiencing an abnormally high period of rain does not have a significant effect on educational performance, the occurrence of a dry spell does. In column 1 of Panel A we see that abnormally dry periods reduce the students' mathematics achievement score by 0.047 standard deviations and in column 2, that they increase by 1.06 pp the share of students with inadequate performance. This result is in line with the findings in Adhvaryu et al. (2018), who show that droughts in Mexico carry a higher penalty for children in terms of total years of completed education and grade progression. Nevertheless, a 10 pp increase in the share of individuals covered by health insurance buffers around 32% of the impact on test scores, and 37% of the effect on the exam failure rate (columns 1 and 2). The results for the verbal test display a similar picture, but with somewhat smaller point estimates (Panel B).

Appendix Tables A.4 and A.5 show the results of combining the intensity of rainfall with the type of shock and divide shocks by floods (precipitations above 2 standard deviations from the regional historical mean), rainfall above-normal levels (between 1 and 2 standard deviations above), below-normal rainfall (between 1 and 2 standard deviations below), and droughts (below 2 standard deviations). The results show that while floods increase by 0.91 pp the failure rate in mathematics (significant at the 10% level) (column 1 of Table A.4), droughts increase the share of students with inadequate attainment by 4.4 pp (significant at the 1% level). However, in the event of droughts, each 10 pp increase in the SP coverage rate mitigates by 1.1 pp the negative effect. Table A.5 shows similar results for the verbal evaluation, with the experience of droughts having more negative consequences on students' cognitive attainment than periods of rainfall excess.

5.3 Regional disparities

Although disturbances in precipitation levels could impact students' productivity in school in many ways, the effect of rainfall in disrupting performance may vary across areas with different levels of development and infrastructure. To assess whether there is regional heterogeneity in the impact of shocks on cognitive achievement I divide schools by the level of marginalization of the area in which they are located.[30] When schools in marginalized areas experience a negative rainfall shock, students' achievement score in mathematics drops by 0.022 standard deviations (column 1 of Table 5). However, each 10 pp increase in the health coverage rate absorbs 27% of the negative effect (significant at the 1% level). This reduction is of 0.020 standard deviations in the verbal section, with a 10 pp increase in the coverage rate mitigating 30% of the effect. On the other hand, rainfall shocks have no significant effect on test scores in non-marginalized areas (column 1 of Table 6).

I also differentiate the effects between rural localities, small urban localities with less than 50,000 inhabitants, and large urban localities with more than 50,000 inhabitants. The results show that while rainfall shocks negatively affect mathematics learning in rural areas (Appendix Table A.6), they pose no statistically significant reduction in test performance in urban areas irrespective of their population size (Appendix Tables A.7 and A.8). The estimated results in the verbal section of the national evaluation are similar. For instance, rainfall shocks in rural locations increase the verbal failure rate by 0.43 pp, with health insurance mitigating by 0.15 pp the negative effect per each 10 pp increase in the health coverage rate (column 2 of Table A.6).

These results point out that rainfall shocks and health insurance have significant differential effects depending on the region's characteristics. In rural areas, where precipitations are more closely linked to income generation through agricultural production (or in more marginalized areas, where there is lower infrastructure and the population is more vulnerable to shocks), the experience of atypical rainfall may result in higher stress levels for families and children. Indeed, Mexico is considered an arid or semi-arid country, and according to the National Agricultural Survey[31] of 2017, the share of rainfed agriculture in Mexico amounts to 79% of the total cultivated area. In urban areas, on the other hand, rainfall disturbances might not be the best measure to capture shocks (either health or income shocks) to children and their families, and the benefits from SP are less likely to be linked to its ability to build

[30] I consider a school to be marginalized if it is established in a locality considered to be experiencing some degree of marginalization (medium, high, or very high) according to the National Population Council (CONAPO).

[31] Encuesta Nacional Agropecuaria, carried out by the National Institute of Statistics and Geography (INEGI).

resilience against climatic shocks.

6 Robustness

As noted earlier, the rolling out of Seguro Popular was not random. The expansion of the program gave priority to states and municipalities with a) low social security coverage, b) larger number of uninsured individuals in the first six deciles of income, c) capacity to offer the services granted, d) higher pool of potential affiliates, and e) explicit request from the state authorities, all subject to available financial resources.[32] In this section I first assess the determinants of the timing of SP implementation following Bosch and Campos-Vazquez (2014) and Conti and Ginja (2017) by estimating the following equation:

$$Quarter_{ms} = \theta X_{ms} + \mu_s + \epsilon_{ms} \tag{2}$$

Where $Quarter_{ms}$ is the quarter of implementation of SP in municipality m of state s, X_{ms} is a series of socio-demographic, political, health care, and primary education indicators measured before the program start, and ϵ_{ms} is the error term. The regression includes state fixed effects μ_s, as the timing in which the states were offering the new health scheme was negotiated with the federal government. On the other hand, it was less clear as to which municipalities were to receive the program first. Therefore, I study the determinants of the program rollout within states but also estimate the model without state fixed effects for comparison. While I do not have information on test results before the start of the program, I measure municipality pre-program trends in education with the evolution of the primary completion rate, and with the pass rate of the grades evaluated in ENLACE.

Appendix Table A.9 displays the results of estimating equation (2). Columns 1 and 3 show the model estimates without state fixed effects. At the country level, municipalities with greater population size and with more medical personnel received the program first. Political alignment is also a good predictor of program implementation, as the occurrence of

[32]Diario oficial Viernes 04 de Julio de 2003: Acuerdo por el que la Secretaría de Salud da a conocer las reglas de operación e indicadores de gestión y evaluación del Programa Salud para Todos (Seguro Popular de Salud).

same political party in both the state and municipal government predict the implementation of SP three quarters earlier than in municipalities without political alignment. With this specification, municipalities with a higher share of eligible population and with higher levels of marginalization implemented the program later. In columns 2 and 4, when assessing the program expansion within states, we observe a similar picture, except for the share of individuals that were eligible to the program, which coefficient changes sign and suggests that within states the program started first in areas with higher potential demand. Moreover, the evolution in the primary completion rate and in the pass rate of the grades evaluated in ENLACE in the 5 years preceding the program start is not significantly correlated with the timing of the program implementation in any of the specifications. Although the coefficient for missing pre-program information on the evolution of primary education predicts receiving SP 2.5 quarters later, it is not statistically significant when including state fixed effects.

I further inspect the determinants of the SP coverage rate expansion after it is implemented in a municipality. Appendix Table A.10 shows the results of estimating a variation of equation (2) where the dependent variable quarter of implementation is replaced with the increase in the coverage rate in the first, second, and third year after SP implementation. Columns 1 and 2 show that, once SP is implemented, the share of eligible individuals is the main determinant of its expansion. The coverage rate increases by 33 percentage points in the first year in a municipality where everybody is eligible. Higher marginalization, which is closely linked to eligibility, also explains higher program enrolment. On the other hand, population size is negatively related with coverage expansion. Health infrastructure measured as doctors per eligible population also predicts a small but significant higher coverage expansion in the first year. In the second year (Columns 3 and 4), only eligibility and population size are able to explain enrolment, and in the third year, only eligibility remains significant (Columns 5 and 6). Political alignment and the evolution of indicators in primary education do not predict coverage expansion. In line with these results, Appendix Figure A.3 shows that coverage greatly responds to availability in the first year, it is stable in the following four years, and further lowers from year six onward as the program nears full coverage.

Following, I test the robustness of the main results to various specifications. Results for the mathematics test are displayed in Table 7, while Table 8 shows the results in the verbal evaluation. I also show the estimate of β_2 from equation (1) to examine how its estimated value change across specifications. Column 1 shows the coefficient estimates from the main specification (equation [1]). In column 2 I add an interaction term of the presence of a rainfall shock with municipality expenses per capita on the Oportunidades/Progresa program. This interaction allows testing whether the estimated shock-mitigating effect from the expansion of health insurance partly reflects the mitigating effect of cash transfers in Mexico. Results do not change. Column 3 controls for the political alignment defined as same political party in the state and municipal government. This specification accounts for the possibility that the political environment could be affecting the level of resources (including higher expenses on both education and health) in the different municipalities. The results are practically identical. In column 4 I include all the pre-program municipality characteristics correlated with the rollout of Seguro Popular (except for the share of eligible individuals) interacted with a linear trend (see Appendix Tables A.9 and A.10). Notice that this is a demanding test, as the information on test scores is only available from 2006 onward, and the expansion of SP could have already affected the evolution of educational achievement. The point estimates reduce in magnitude. The effect of a rainfall shock on the mathematics test scores reduces from -0.022 to -0.017 standard deviations, and the mitigating effect from 0.007 to 0.006 standard deviations (column 4 of Table 7). Moreover, the correlation between SP expansion and test scores during stable precipitations becomes null, suggesting that health insurance impacted cognitive attainment only through its ability to mitigate the negative effect of shocks on students' performance in school. Column 5 further includes the share of eligible individuals at the program start interacted with a trend. This specification produces the lowest point estimates, as the coverage rate of Seguro Popular is highly correlated with population eligibility, and the program is suspected to have the largest effect in regions with a higher proportion of eligible individuals. Even then, the shock-mitigating effect of SP on mathematics test scores is estimated to be of 0.005 standard deviations per each 10 pp increase in the coverage rate (column 5 of Table 7), and of 0.004 standard deviations on the verbal results (column 5 of Table 8), both magnitudes significant at the 1% level. Column 6 displays the results of a placebo test that consists of interacting future rainfall shocks with the healthcare coverage rate and shows that future rainfall does not have a significant effect on current test scores. Column 7 includes one lag of the rainfall shock and shows that the effect on test scores is mainly driven by contemporaneous disturbances. However, there is a lasting protective effect on current test scores from health coverage during past negative shocks. In the base specification, I cluster the standard errors at the municipality level. Column 8 shows standard errors adjusted for spatial correlation with the method developed in Conley (1999), and using a radius of 200km around each locality centroid to define areas independent of administrative boundaries. Column 9 excludes those localities in which there is no variation in rainfall shocks (either always or never experienced a rainfall shock), and column 10 replaces school-locality level rainfall shocks with shocks measured at the municipality level. Rainfall shocks measured at the municipality level have a larger effect on school achievement, and healthcare coverage has a lower mitigating effect. However, this likely reflects the impact of a larger shock in absolute terms, as average precipitations are more stable when computed over a broader area. The results discussed above still hold.

As noted earlier, I do not have information on test scores before 2006 to test for pre-trends in the full sample. However, I can conduct a test of pre-trends in academic achievement for a sample of late reformers. With the available data the test consists in analyzing whether the evolution in test scores between 2006 and 2007 (earliest pair of years) can predict future SP implementation. Given that by the end of 2007 most of the municipalities had already implemented the social healthcare program (see Appendix Figure A.4), I define late reformers as those municipalities in which by 2007 the program had not yet been widely expanded (low coverage rate). More specifically, I define two groups of late reformers: a) municipalities with a coverage rate below 5% in 2007; and b) municipalities with a coverage rate below 10% in 2007. Formally, I estimate the following equation:

$$\Delta score_{(06-07)slm} = \eta + \rho \Delta SP_{(07-08)m} + \alpha' Z_{slm} + \zeta' X_{lm} + \mu_r + \epsilon_{slm} \quad (3)$$

Where $\Delta score_{(06-07)slm}$ is the increase in test scores between 2006 and 2007 in school s, of locality l, in municipality m; $\Delta SP_{(07-08)m}$ is the increase in the Seguro Popular coverage between 2007 and 2008 in municipality m; Z_{slm} and X_{lm} are the same school and regional controls as in equation (1), and μ_r are state fixed effects. Appendix Table A.11 shows the estimated results. In columns 1 and 3 the sample is restricted to those municipalities in which the coverage rate in 2007 was lower than 5% and in columns 2 and 4, lower than 10%. The estimated coefficient ρ is practically zero and statistically insignificant, suggesting that the expansion in health coverage induced by SP was not related to the evolution of students' performance in school.

Another concern for the validity of the results involves endogenous migration patterns (or children leaving the school more generally). If rainfall shocks affect migration decisions of families and family characteristics are related to both migration decisions and child characteristics, the effect of rainfall shocks on school test scores could be biased. The bias would be downwards if higher-performing children are the ones leaving the school, or upwards, if the children leaving are those with lower educational performance. Using the Statistics 911 I create an indicator for the ratio of children that did not complete the academic year in the school in which they started it (the share of students that drop out), and inspect whether this indicator is related to the experience of rainfall shocks or the interaction of rainfall with SP expansion. Column 1 of Appendix Table A.12 shows that the probability of students dropping out from the school is not associated with the experience of a rainfall shock in the locality nor with then interaction of rainfall with SP expansion in the event of a rainfall sock.

Finally, to rule out any additional compositional bias arising from negative shocks in the locality affecting the type of students that sit the academic evaluation, I test whether the number of students evaluated in each school is affected by the experience of a rainfall shock. The results of this test, displayed in column 2 of Appendix Table A.12, show that neither rainfall shocks nor the interaction of rainfall with the expansion of SP have a significant effect on the number of students evaluated.

7 Mechanisms

This section inspects potential channels that could help explain why rainfall shocks negatively affect children's performance in school, and the role of access to health insurance in mitigating the effects. To do so, I move from school-level data to individual and household-level data, described in greater detail in Section 3. I can now construct a measure of access to social health insurance that exploits individual variation: years of exposure to Seguro Popular. The number of years a child had access to SP depends on the child's age and the introduction date of the program in the child's municipality of residence (subject to eligibility). I assess the impact of rainfall shocks and access to SP among children aged 6 to 14 and their families, and who were interviewed during the third wave of the Mexican Family Life Survey (between 2009 and 2011). I also estimate a model of household fixed effects to assess the impact of rainfall shocks and health insurance on household consumption by including the consumption information available in the previous survey (years 2005-2006). Notice that at the household level, exposure to SP only varies by its introduction date in the municipality of residence.

In the MxFLS it is possible to infer whether a household is eligible to SP by inspecting their availability and access to formal health insurance (in which case the household is deemed ineligible). In the survey, individuals respond to all the different health insurance schemes they benefit from, which include insurance from the Social Security: IMSS, ISSTE, PEMEX, and other minor schemes; and other private plans (either privately purchased or offered by their employer). As long as one household member has access to any form of formal health insurance, this one extends to the rest of the family, and I define such a household ineligible to Seguro Popular. All other households in which none of the members have access to formal health insurance are deemed eligible to SP (48% of all households in the sample). I focus on eligibility rather than affiliation to SP to avoid a potential self-selection bias. On the other hand, rainfall shocks are now measured at the municipality level, as opposed to shocks at the locality level, as the latter information is deemed confidential and is not disclosed.

7.1 Specification

To capture the impact of rainfall shocks on educational inputs and any potential mitigating effect arising from access to health insurance I estimate the following equation:

$$y_{im} = \beta_1 R_m + \beta_2 SP(years)_{im} + \beta_3 SP(years)_{im} R_m + \zeta' X_{im} + \delta_t + \mu_z + \epsilon_{im} \tag{4}$$

Where y_{im} are indicators of the health and time use of children, R_m is a rainfall shock dummy reflecting whether the precipitations gathered in the municipality of residence in the

12 months preceding the interview date were above or below one standard deviation from the historical regional mean, $SP(years)_{im}$ controls for the number of years a child had Seguro Popular available in her municipality (which depends on the child's age and the introduction date of SP in the municipality), and $SP(years)_{im}R_m$ is the interaction of the two terms. Similarly as before, β_1 and β_3 are the coefficients of interest. X_{im} is a set of children, family, and regional covariates[33], δ_t and μ_z are dummies for month and year of interview respectively, and ϵ_{ms} is the error term. Similarly, to capture the effect of rainfall shocks on household's economic resources I estimate the following equation:

$$log(C_{imt}) = \beta_1 R_{mt} + \beta_2 SP(years)_{mt} + \beta_3 SP(years)_{mt} R_{mt} + \\ \Omega' H_{imt} + \delta_t + \mu_z + \gamma_i + \upsilon_{imt} \quad (5)$$

Where $log(C_{imt})$ is the logarithm of the equivalised household expenditures in non-durable goods[34], $SP(years)_{mt}$ is now defined at the household level (and depends only on the date that SP was introduced in the municipality of residence), H_{imt} is a vector of household characteristics relating to household composition, wealth, and information about the household head[35], δ_t and μ_z are dummies for month and year of interview respectively, γ_i are household fixed effects, and υ_{imt} is the error term.

[33] The child's gender and age (categorical dummies), whether the child speaks an indigenous language, attends a public school, and assists an evening shift, the age, gender, and marital status of the household head, the total number of individuals in the household, dummies of mother's and father's education (no education, primary school, secondary school, and high school or higher), whether the households owns the house, has piped water inside, or toilet, whether the household cooks with wood or coal, dummies for the quality of the roof and floor, and type of location (urban or rural).

[34] That is, excluding expenses on electronic appliances, furniture, property, and acquisition of vehicles. I construct the expenditures equivalence scale for Mexican households following Teruel et al. (2005), and assign a factor of 0.77 to children from 0 to 5 years old, 0.80 to children from 6 to 12 years old, 0.74 to children from 13 to 18 years old, and 1 to adults above 18 years of age.

[35] The full list of household characteristics are: the age, gender, education, and marital status of the household head, the total number of individuals living in the household, the number of children under age 5, the number of individuals between 6 and 10 years of age, between 11 and 18 years old, between 19 and 45 years old, between 46 and 60 years old, and more than 60 years old, whether the households owns the house, has piped water inside, toilet, whether the household cooks with wood or coal, dummies for the quality of the roof and floor, type of location (urban or rural), an interviewer-reported variable on the accuracy of reported expenditures (dummy for excellent accuracy), and a dummy controlling for whether the household expenditures questionnaire was filled by the same respondent in the different waves.

7.2 Results: Mechanisms

Table 9 shows the results of estimating equation (4). Robust standard errors are shown in parenthesis, while clustered errors at the municipality level are displayed between brackets. Column 2 shows that rainfall shocks increase the probability of children being sick in the four weeks prior to the interview date by 5 percentage points (an increase in the probability of 61%). However, the availability of SP in the municipality reduces this probability by 1.2 percentage points per year of exposure.[36] Similarly, rainfall shocks increase the probability of children looking after elderly, sick people, or other children, by 7 pp (44% increase, column 4), and doing domestic chores by 9.3 pp (17% increase, column 6). However, and similarly, the expansion and availability of financial protection in health reduces the demand for children's time in domestic tasks when hit by climatic shocks. The difference in the estimates between the specification that includes basic controls (columns 1, 3, and 5) and the specification that includes a broader set of controls (columns 2, 4 and 6) are small, in line with rainfall shocks being orthogonal to children and households' characteristics.

As discussed previously, the new healthcare scheme was targeted at those individuals outside of the social security system, and therefore uninsured. Table 10 shows the results of estimating equation (4) separately by eligibility status (SP eligible – with no formal insurance –, and SP ineligible – with access to formal insurance).[37] We can see that the point estimates for the probability of sickness, caring for others, and doing domestic chores of children in eligible families are higher in magnitude in the event of negative shocks, as well as the mitigating effect from availability of SP (Panel A). On the other hand, there are no statistically significant effects on health status and time use for those children in families ineligible for the new healthcare scheme (Panel B). While a rainfall shock increases by 6.6 percentage points the probability of being sick among children from eligible households (column 2 of Panel A), each additional year of access to SP reduces by 1.5 percentage points this probability (significant at the 5% level). Similarly, the probability of children carrying

[36]The sickness variable's exact definition is the inability of children to carry any of their normal daily activities due to sickness in the last four weeks. Therefore, the variable should also capture temporary school absence if the interview took place during the academic year.

[37]I define insurance status at the household level, as the insurability of one of the family members extends to the rest of the family.

out household chores increases by 14.1 pp during adverse rainfall shocks (column 6 of Panel A). However, an additional year of SP eligibility reduces the effect by 3.5 pp (significant at the 1% level). Dividing the sample by rural and urban locations generates a similar picture (Appendix Table A.13), where the benefits from SP availability in the event of rainfall shocks are mainly concentrated in rural areas (where the share of eligible individuals is higher and adverse weather presumably has more pervasive consequences on children and their families that in urban areas).

Finally, I assess whether the experience of negative climatic shocks affects the economic resources of the household (measured as equivalised household consumption expenditures in non-durable goods). In the consumption regression (equation [5]), I exclude the households in the top and bottom percentile in equivalised household expenditures. Column 6 of Table 11 shows that the experience of a rainfall shock reduces by 16% the equivalised household consumption level among households eligible to SP (with no formal insurance). However, each additional year of financial protection in health reduces the negative effect by 4% (significant at the 10% level). The point estimates of these effects are similar for households in rural areas (column 10). In rural areas, a negative rainfall shock reduces household consumption by 18%, similar to the reduction estimated in Bobonis (2009) for a sample of rural households in Mexico (16.7%). However, an additional year of SP availability reduces this effect by 3%. On the other hand, rainfall shocks do not translate into any significant reduction in household consumption among families with access to formal health insurance or living in urban areas (in which case there are no additional benefits from the expansion in health coverage).

8 Conclusion

As the world moves closer to achieving the Millennium Developmental Goal of universal primary completion, significant challenges to ensure effective learning in the classroom remain. Poverty and marginalization continue to be significant predictors of human capital accumulation among children, and negative shocks experienced during childhood threaten to aggravate the existent inequalities by households' ability to cope with them. This study shows that a state intervention to reduce inequality in healthcare access protected the educational achievement of primary school children in the event of negative shocks. The expansion of social healthcare, instrumented with the reform of the Mexican health system and the creation of a health program addressed to the population ineligible for social health insurance, offset the negative effect of rainfall shocks on cognitive achievement by serving as a safety net for children and their families.

This result points towards synergies from public investments in education and health, and from higher returns to educational investments when the ability of families to endure shocks is increased. In this regard, the study shows that the expansion in health coverage mitigated the negative effect of rainfall shocks on children's health among program-eligible households, reduced the demand for children's time, and protected household's consumption from fluctuations accruing from rainfall disturbances. The results add to a new stream of research that investigates whether shocks to human capital during childhood can be mitigated through different policies or interventions, by showing the capacity of universal health coverage in buffering negative environmental shocks.

As climate disturbances are felt the most in regions with weaker infrastructure and higher dependence on climate, the discouraging evolution of weather patterns is likely to aggravate the existing gap in cognitive achievement by socio-economic disadvantage. However, estimates show larger positive effects from universal healthcare in more marginalized areas. The results presented here are also relevant amid the growing number of countries expanding healthcare coverage and should be considered when carrying out a cost-benefit analysis of public investments in health. Nevertheless, the extent to which the expansion in social health insurance is accompanied by improvements in health care infrastructure, including its efficiency, will determine the capacity of national health systems in protecting individuals and families from financial and other health-related shocks.

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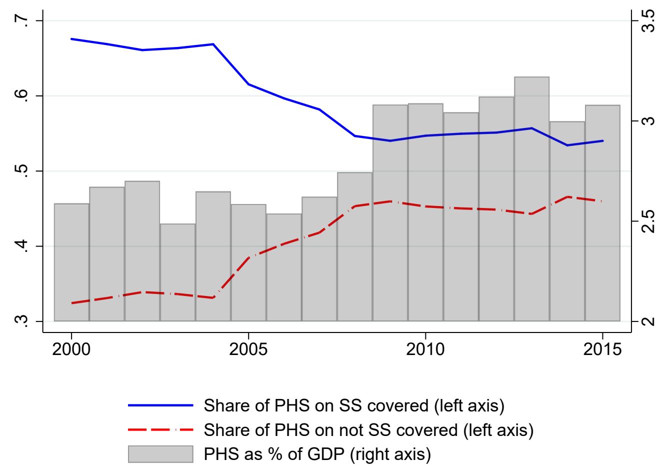
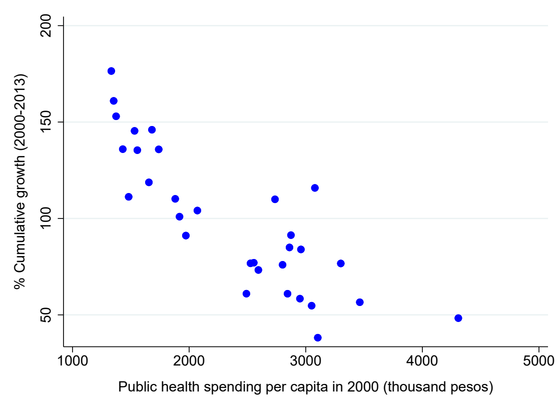
Figure 1: Evolution of public health spending. Total and by insurance status



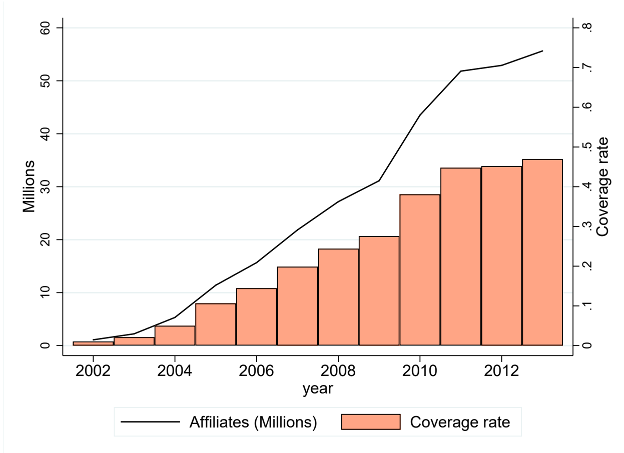
Note: PHS: Public Health Spending. SS: Social Security.
Source: General Directorate of Health Information, Ministry of Health.

Figure 2: Regional convergence in per capita public health spending



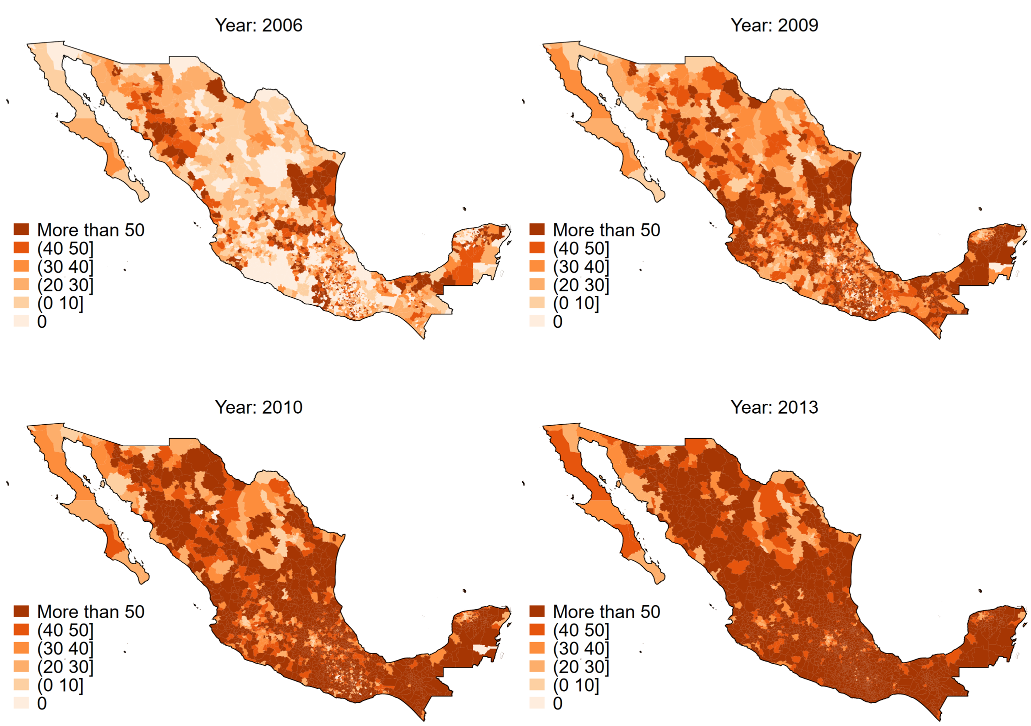
Note: Cumulative growth refers to the increase in public health spending per capita. The graph excludes Mexico City, for which the public health spending per capita in the year 2000 was of 9,144 pesos, and where public health spending grew by 35% between the year 2000 and 2013. Each dot conveys the information for the remaining 31 states of Mexico.
Source: Directorate of Health Information, Ministry of Health.

Figure 3: National Affiliation to Seguro Popular



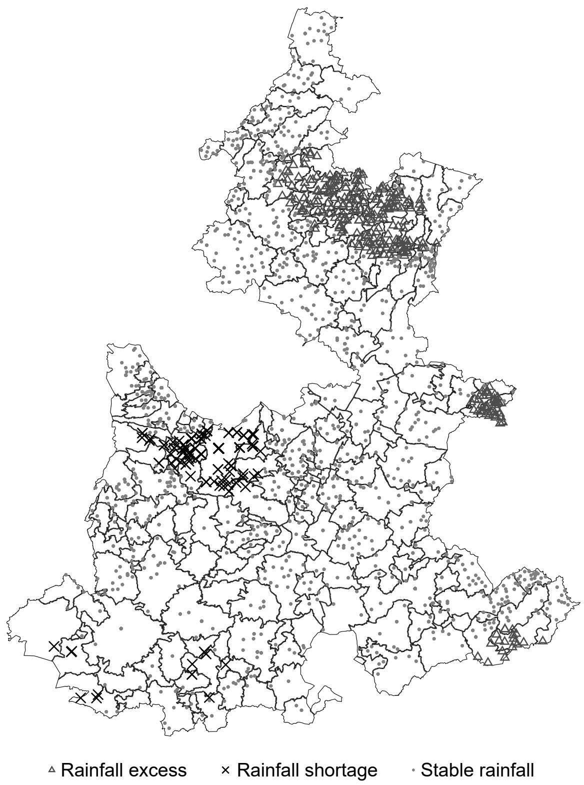
Note: The coverage rate is defined as the number of affiliates divided by the total population.
Source: Ministry of Social Security.

Figure 4: Geographical evolution of Seguro Popular coverage rate (%)



Note: The coverage rate is defined as the number of affiliates divided by the population size in each municipality.

Figure 5: Pre-exam locality-level rainfall in the state of Puebla (2006)



Note: Each mark in the map depicts a locality in which there is at least one school evaluated in ENLACE. Rainfall excess is defined as precipitations in the 12 months preceding the test evaluation above one standard deviation from the regional historical mean, rainfall shortage is defined as precipitation levels below one standard deviation, and stable precipitations as rainfall within one standard deviation.

Table 1: Summary statistics: Sample of schools (ENLACE)

	Mean	SD
Mathematics results		
Math score	524.36	71.12
Math (% Inadequate)	20.38	16.30
Math (% Fair)	49.27	14.40
Math (% Good+)	30.35	21.63
Verbal results		
Verbal score	516.35	63.84
Verbal (% Inadequate)	19.93	15.56
Verbal (% Fair)	49.59	13.96
Verbal (% Good+)	30.48	21.24
School characteristics		
Share of girls	0.49	0.07
Students per teacher	26.51	8.07
Head of school also teaches	0.29	0.46
Students evaluated	136.86	114.42
Dropout rate (pp)	3.41	4.11
Very low marginalization	0.41	0.49
Low marginalization	0.18	0.38
Medium marginalization	0.12	0.33
High marginalization	0.24	0.43
Very high marginalization	0.04	0.21
School programs		
Safe School	0.17	0.38
Extending School Hours	0.02	0.12
Quality Schools	0.26	0.44
Seguro Popular coverage		
SP coverage rate (pp)	34.33	24.22
SP coverage increase (pp)	36.31	17.34
Rainfall shocks		
Rain shock (total)	0.29	0.45
Rain excess	0.14	0.35
Rain shortage	0.14	0.35
# schools	49,751	
# periods (years 2006-2013)	8	
Observations	398,008	

Table 2: Summary statistics: Sample of children (MxFLS)

	Mean	SD
Child variables		
Age	10.11	2.60
Female	0.50	0.50
Indigenous language	0.16	0.36
Sick	0.08	0.27
Attending school	0.96	0.19
Caring for others	0.16	0.37
Household chores	0.56	0.50
Work for pay	0.03	0.16
Work family business	0.01	0.09
Work in agriculture	0.03	0.18
SP exposure (years)	4.58	1.66
Rainfall shock	0.29	0.45
Mother's education		
No education (mother)	0.14	0.35
Primary (mother)	0.38	0.48
Secondary (mother)	0.31	0.46
High school + (mother)	0.17	0.38
Father's education		
No education (father)	0.30	0.46
Primary (father)	0.30	0.46
Secondary (father)	0.23	0.42
High school + (father)	0.17	0.37
Household variables		
Male hh head	0.78	0.42
Age hh head	44.59	13.07
Married hh head	0.70	0.46
Household size	6.02	2.45
Owns house	0.66	0.47
Tubed water	0.25	0.43
Toilet	0.75	0.43
Cooks with wood or coal	0.39	0.49
Favorable floor material	0.36	0.48
Favorable roof material	0.77	0.42
Rural	0.46	0.50
Observations	5,720	

Table 3: Test score results: Mathematics

	(1) Math score SD	(2) Math (Inadequate) pp	(3) Math (Fair) pp	(4) Math (Good+) pp
Rainfall shock	−0.022***	0.647***	−0.253*	−0.394**
	(0.008)	(0.148)	(0.139)	(0.171)
SP (coverage rate)	0.020***	−0.692***	0.490***	0.203**
	(0.004)	(0.089)	(0.081)	(0.085)
Rainfall shock X SP	0.007***	−0.206***	0.091***	0.115***
	(0.002)	(0.033)	(0.034)	(0.036)
Students per teacher	−0.007***	0.113***	0.022***	−0.135***
	(0.001)	(0.013)	(0.007)	(0.014)
Head of school also teaches	−0.053***	0.954***	−0.192	−0.762***
	(0.006)	(0.110)	(0.118)	(0.141)
Share of girls	0.283***	−6.058***	0.915*	5.142***
	(0.026)	(0.492)	(0.531)	(0.593)
Safe School program	−0.002	0.389**	−1.166***	0.777***
	(0.009)	(0.154)	(0.158)	(0.205)
Extending School Hours program	0.084***	−1.356***	−0.304	1.660***
	(0.015)	(0.229)	(0.252)	(0.324)
Quality Schools program	0.015***	−0.547***	0.304***	0.243**
	(0.005)	(0.081)	(0.078)	(0.102)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	398,008	398,008	398,008	398,008
# schools	49,751	49,751	49,751	49,751

Note: Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above or below 1 standard deviation from the regional historical mean (since 1950). SP (coverage rate) is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size and scaled up by a factor of 10 so that a value of 10 represents full coverage. Rainfall shock X SP is the interaction of the two terms. The share of girls is defined from 0 to 1, and Safe School, Extending School Hours, and Quality Schools programs are dummy variables indicating whether the school participates in any of these programs. Controls include 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table 4: Test score results: Verbal

	(1) Verbal score SD	(2) Verbal (Inadequate) pp	(3) Verbal (Fair) pp	(4) Verbal (Good+) pp
Rainfall shock	−0.020***	0.482***	−0.176	−0.307*
	(0.007)	(0.129)	(0.151)	(0.157)
SP (coverage rate)	0.013***	−0.558***	0.526***	0.032
	(0.004)	(0.078)	(0.076)	(0.073)
Rainfall shock X SP	0.006***	−0.149***	0.058*	0.091***
	(0.001)	(0.027)	(0.033)	(0.033)
Students per teacher	−0.006***	0.105***	−0.000	−0.105***
	(0.001)	(0.011)	(0.006)	(0.011)
Head of school also teaches	−0.052***	0.939***	−0.289***	−0.650***
	(0.006)	(0.104)	(0.108)	(0.128)
Share of girls	0.528***	−9.821***	−0.269	10.091***
	(0.024)	(0.453)	(0.497)	(0.519)
Safe School program	0.006	0.343**	−1.349***	1.006***
	(0.009)	(0.135)	(0.141)	(0.192)
Extending School Hours program	0.075***	−1.342***	−0.200	1.542***
	(0.015)	(0.217)	(0.222)	(0.310)
Quality Schools program	0.013***	−0.447***	0.273***	0.174*
	(0.005)	(0.072)	(0.073)	(0.094)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	398,008	398,008	398,008	398,008
# schools	49,751	49,751	49,751	49,751

Note: Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above or below 1 standard deviation from the regional historical mean (since 1950). SP (coverage rate) is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size and scaled up by a factor of 10 so that a value of 10 represents full coverage. Rainfall shock X SP is the interaction of the two terms. The share of girls is defined from 0 to 1, and Safe School, Extending School Hours, and Quality Schools programs are dummy variables indicating whether the school participates in any of these programs. Controls include 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table 5: Test score results: Marginalized schools

	(1) Score (SD)	(2) Inadequate (pp)	(3) Fair (pp)	(4) Good+ (pp)
Panel A: Mathematics				
Rainfall shock	−0.022**	0.615***	−0.442**	−0.173
	(0.010)	(0.215)	(0.217)	(0.216)
Rainfall shock X SP	0.006***	−0.187***	0.119***	0.068*
	(0.002)	(0.039)	(0.044)	(0.040)
Panel B: Verbal				
Rainfall shock	−0.020**	0.454**	−0.411**	−0.042
	(0.010)	(0.200)	(0.205)	(0.198)
Rainfall shock X SP	0.006***	−0.140***	0.098**	0.042
	(0.002)	(0.036)	(0.041)	(0.038)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	185,112	185,112	185,112	185,112
# schools	23,139	23,139	23,139	23,139

Note: Marginalized schools are those established in a locality considered to be experiencing some degree of marginalization (medium, high, or very high) according to the National Population Council (CONAPO). Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above or below 1 standard deviation from the regional historical mean (since 1950). Rainfall shock X SP is the interaction term of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table 6: Test scores results: Non-marginalized schools

	(1) Score (SD)	(2) Inadequate (pp)	(3) Fair (pp)	(4) Good+ (pp)
Panel A: Mathematics				
Rainfall shock	−0.012	0.201*	0.108	−0.309
	(0.009)	(0.117)	(0.134)	(0.202)
Rainfall shock X SP	0.004	−0.033	−0.079**	0.111*
	(0.003)	(0.034)	(0.039)	(0.057)
Panel B: Verbal				
Rainfall shock	−0.012	0.195*	0.093	−0.288
	(0.009)	(0.110)	(0.118)	(0.181)
Rainfall shock X SP	0.004	−0.029	−0.062*	0.091*
	(0.003)	(0.033)	(0.036)	(0.053)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	212,896	212,896	212,896	212,896
# schools	26,612	26,612	26,612	26,612

Note: Non-marginalized schools are those established in a locality considered to be experiencing a low degree of marginalization (low or very low) according to the National Population Council (CONAPO). Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above or below 1 standard deviation from the regional historical mean (since 1950). Rainfall shock X SP is the interaction term of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table 7: ENLACE results in Mathematics: Robustness checks

	(1) Math score SD	(2) Math score SD	(3) Math score SD	(4) Math score SD	(5) Math score SD	(6) Math score SD	(7) Math score SD	(8) Math score SD	(9) Math score SD	(10) Math score SD
Rainfall shock	−0.022***	−0.022***	−0.024***	−0.017**	−0.014**		−0.023***	−0.022*	−0.022***	−0.028***
	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)		(0.008)	(0.013)	(0.008)	(0.008)
SP (coverage rate)	0.020***	0.020***	0.021***	0.001	−0.005	0.014***	0.019***	0.020***	0.018***	0.020***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
Rainfall shock X SP	0.007***	0.007***	0.007***	0.006***	0.005***		0.007***	0.007**	0.007***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)		(0.002)	(0.003)	(0.002)	(0.002)
Rainfall shock X Op		−0.000								
		(0.001)								
Lead Rainfall shock						−0.004				
						(0.008)				
Lead Rainfall shock X SP						0.002				
						(0.002)				
Lagged Rainfall shock							−0.010			
							(0.007)			
Lagged Rainfall shock X SP							0.004**			
							(0.002)			
School FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Political Alignment	No	No	Yes	Yes	Yes	No	No	No	No	No
Pre-SP mun.charac. X Trends	No	No	No	Yes	Yes	No	No	No	No	No
Pre-SP elegibility X Trends	No	No	No	No	Yes	No	No	No	No	No
Spatial corrected standard errors	No	No	No	No	No	No	No	Yes	No	No
Observations	398,008	398,008	398,008	398,008	398,008	348,257	398,008	398,008	375,256	396,800
# schools	49,751	49,751	49,751	49,751	49,751	49,751	49,751	49,751	46,907	49,600

Note: Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above or below 1 standard deviation from the regional historical mean (since 1950). SP (coverage rate) is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size and scaled up by a factor of 10 so that a value of 10 represents full coverage. Rainfall shock X SP is the interaction of the two terms. Rainfall shock X Op is the interaction of the rainfall shock with the municipality per capita expenses (in 1,000 pesos) in the Progresa/Oportunidades program. Controls include the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate. Column 1 displays the main coefficient estimates. Column 2 includes the interaction term of rainfall shock with the municipality expenses per capita in the Oportunidades/Progresa program. Column 3 adds a control for political alignment. In column 4 I further interact pre-program municipality characteristics correlated with the rollout of Seguro Popular with trends (see Table A.9), except for the share of eligible individuals. Column 5 further includes the share of eligible individuals interacted with a trend. Column 6 conducts a placebo test of the effect of future rainfall shocks on current test outcomes. Column 7 includes one lag of the rainfall shock and its interaction with the SP coverage rate. Column 8 displays Conley standard spatial errors calculated using a radius of 200km around each locality centroid. Column 9 excludes those localities in which there is no variation in rainfall shocks (either never or always experienced a rainfall shock). Column 10 replaces school-locality level rainfall shocks with shocks measured at the municipality level. Except in column 8, robust standard errors clustered at the municipality level in parentheses.

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

Table 8: ENLACE results in Verbal: Robustness checks

	(1) Verbal score SD	(2) Verbal score SD	(3) Verbal score SD	(4) Verbal score SD	(5) Verbal score SD	(6) Verbal score SD	(7) Verbal score SD	(8) Verbal score SD	(9) Verbal score SD	(10) Verbal score SD
Rainfall shock	−0.020***	−0.020***	−0.022***	−0.016**	−0.014**		−0.020***	−0.020*	−0.019***	−0.026***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)		(0.007)	(0.010)	(0.007)	(0.007)
SP (coverage rate)	0.013***	0.013***	0.014***	0.000	−0.004	0.008**	0.012***	0.013***	0.011***	0.013***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)
Rainfall shock X SP	0.006***	0.006***	0.006***	0.005***	0.004***		0.006***	0.006**	0.006***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.002)	(0.001)	(0.002)
Rainfall shock X Op		−0.000								
		(0.001)								
Lead Rainfall shock						−0.000				
						(0.007)				
Lead Rainfall shock X SP						0.001				
						(0.002)				
Lagged Rainfall shock							−0.009			
							(0.006)			
Lagged Rainfall shock X SP							0.004**			
							(0.002)			
School FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Political Alignment	No	No	Yes	Yes	Yes	No	No	No	No	No
Pre-SP mun.charac. X Trends	No	No	No	Yes	Yes	No	No	No	No	No
Pre-SP elegibility X Trends	No	No	No	No	Yes	No	No	No	No	No
Spatial corrected standard errors	No	No	No	No	No	No	No	Yes	No	No
Observations	398,008	398,008	398,008	398,008	398,008	348,257	398,008	398,008	375,256	396,800
# schools	49,751	49,751	49,751	49,751	49,751	49,751	49,751	49,751	46,907	49,600

Note: Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above or below 1 standard deviation from the regional historical mean (since 1950). SP (coverage rate) is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size and scaled up by a factor of 10 so that a value of 10 represents full coverage. Rainfall shock X SP is the interaction of the two terms. Rainfall shock X Op is the interaction of the rainfall shock with the municipality per capita expenses (in 1,000 pesos) in the Progresa/Oportunidades program. Controls include the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate. Column 1 displays the main coefficient estimates. Column 2 includes the interaction term of rainfall shock with the municipality expenses per capita in the Oportunidades/Progresa program. Column 3 adds a control for political alignment. In column 4 I further interact pre-program municipality characteristics correlated with the rollout of Seguro Popular with trends (see Table A.9), except for the share of eligible individuals. Column 5 further includes the share of eligible individuals interacted with a trend. Column 6 conducts a placebo test of the effect of future rainfall shocks on current test outcomes. Column 7 includes one lag of the rainfall shock and its interaction with the SP coverage rate. Column 8 displays Conley standard spatial errors calculated using a radius of 200km around each locality centroid. Column 9 excludes those localities in which there is no variation in rainfall shocks (either never or always experienced a rainfall shock). Column 10 replaces school-locality level rainfall shocks with shocks measured at the municipality level. Except in column 8, robust standard errors clustered at the municipality level in parentheses.

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

Table 9: Children's health and time use

	Sick		Caring		Chores	
	(1)	(2)	(3)	(4)	(5)	(6)
Rainfall shock	0.056	0.050	0.065	0.070	0.090	0.093
	(0.022)***	(0.022)**	(0.029)**	(0.030)**	(0.038)**	(0.039)**
	[0.030]*	[0.029]*	[0.052]	[0.050]	[0.053]*	[0.054]*
Rainfall shock X SP(years)	−0.013	−0.012	−0.015	−0.016	−0.026	−0.026
	(0.004)***	(0.005)***	(0.006)**	(0.006)***	(0.008)***	(0.008)***
	[0.006]**	[0.006]**	[0.009]*	[0.009]*	[0.010]**	[0.011]**
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes
Additional controls	No	Yes	No	Yes	No	Yes
Mean depvar	0.082	0.082	0.159	0.159	0.559	0.558
Observations	5.792	5.720	5.859	5.786	5.859	5.786
R^2	0.011	0.017	0.045	0.063	0.143	0.149

Note: Sick is a binary variable equal to one if the child stopped doing any of her daily activities due to sickness in the past four weeks. Caring is a dummy variable recording whether the child took care of elderly or sick people and/or other children in the last week. Chores is a dummy variable equal to one if the child did domestic chores in the past week. Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the municipality of residence during the 12 months preceding the interview date were above or below 1 standard deviation from the regional historical mean. Rainfall shock X SP(years) is the interaction term of Rainfall shock with the number of years a child had Seguro Popular available. The basic controls are the number of years a child had Seguro Popular available, dummies for year and month of interview, child's age, and gender. Additional controls include whether the child speaks an indigenous language, four categories of father's and mother's education: no education, secondary, and high school or higher, the age, gender, and marital status of the household head, ownership status of dwelling, rural location, whether the household has piped water into the house, toilet, cooks with wood or coal, and indicators of the quality of the materials of the floor and roof.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parenthesis. Robust standard errors clustered at the municipality level in brackets.

Table 10: Children's health and time use by eligibility to Seguro Popular

	Sick		Caring		Chores	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: SP Eligible						
Rainfall shock	0.067	0.066	0.098	0.088	0.145	0.141
	(0.027)**	(0.029)**	(0.041)**	(0.041)**	(0.051)***	(0.052)***
	[0.036]*	[0.037]*	[0.079]	[0.073]	[0.067]**	[0.067]**
Rainfall shock X SP(years)	−0.016	−0.015	−0.020	−0.018	−0.036	−0.035
	(0.006)***	(0.006)**	(0.008)**	(0.009)**	(0.011)***	(0.011)***
	[0.007]**	[0.007]**	[0.015]	[0.015]	[0.013]***	[0.013]***
Observations	2936	2900	2970	2933	2970	2933
R^2	0.021	0.028	0.055	0.080	0.163	0.176
Panel B: Not SP Eligible						
Rainfall shock	0.043	0.031	0.033	0.032	0.043	0.040
	(0.035)	(0.036)	(0.043)	(0.045)	(0.058)	(0.060)
	[0.042]	[0.042]	[0.049]	[0.049]	[0.069]	[0.071]
Rainfall shock X SP(years)	−0.011	−0.008	−0.010	−0.009	−0.019	−0.017
	(0.007)	(0.007)	(0.009)	(0.009)	(0.012)	(0.012)
	[0.008]	[0.008]	[0.009]	[0.009]	[0.014]	[0.014]
Observations	2,827	2,797	2,859	2,829	2,859	2,829
R^2	0.012	0.023	0.043	0.072	0.138	0.144
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes
Additional controls	No	Yes	No	Yes	No	Yes

Note: A child is eligible to SP if family does not have any other form of health insurance. Sick is a binary variable equal to one if the child stopped doing any of her daily activities due to sickness in the past four weeks. Caring is a dummy variable recording whether the child took care of elderly or sick people and/or other children in the last week. Chores is a dummy variable equal to one if the child did domestic chores in the past week. Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the municipality of residence during the 12 months preceding the interview date were above or below 1 standard deviation from the regional historical mean. Rainfall shock X SP(years) is the interaction term of Rainfall shock with the number of years a child had Seguro Popular available. The basic controls are the number of years a child had Seguro Popular available, dummies for year and month of interview, child's age, and gender. Additional controls include whether the child speaks an indigenous language, four categories of father's and mother's education: no education, secondary, and high school or higher, the age, gender, and marital status of the household head, ownership status of dwelling, rural location, whether the household has piped water into the house, toilet, cooks with wood or coal, and indicators of the quality of the materials of the floor and roof.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parenthesis. Robust standard errors clustered at the municipality level in brackets.

Table 11: Equivalised household expenditures (in logs)

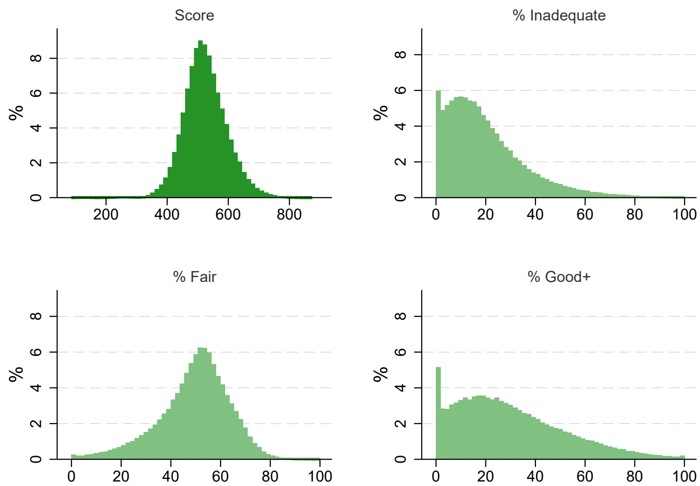
	All		Not SP Eligible		SP Eligible		Urban		Rural	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Rainfall shock	−0.084	−0.089	−0.041	−0.014	−0.129	−0.161	−0.052	−0.053	−0.153	−0.180
	(0.041)**	(0.041)**	(0.058)	(0.058)	(0.059)**	(0.058)***	(0.057)	(0.058)	(0.068)**	(0.068)***
	[0.060]	[0.059]	[0.070]	[0.071]	[0.099]	[0.097]*	[0.062]	[0.064]	[0.075]*	[0.068]**
Rainfall shock X SP(years)	0.015	0.014	0.002	0.005	0.036	0.040	0.007	−0.001	0.021	0.030
	(0.011)	(0.012)	(0.016)	(0.017)	(0.018)**	(0.018)**	(0.015)	(0.016)	(0.017)	(0.017)*
	[0.014]	[0.015]	[0.018]	[0.019]	[0.018]	[0.017]*	[0.020]	[0.020]	[0.028]	[0.027]
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	4,703	4,602	2,388	2,338	2,300	2,249	2,507	2,446	2,196	2,156
R^2	0.038	0.076	0.052	0.127	0.060	0.098	0.057	0.106	0.053	0.094

Note: Household expenditures consist of all expenses in non-durable goods. The expenditures equivalence scale used is the one estimated by Teruel et al. (2005). A household is eligible to SP if family does not have any other form of health insurance. Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the municipality of residence during the 12 months preceding the interview date were above or below 1 standard deviation from the regional historical mean. Rainfall shock X SP(years) is the interaction term of Rainfall shock with the number of years a household had Seguro Popular available. The basic controls are the number of years a household had Seguro Popular available and dummies for year and month of interview. Additional controls include the age, gender, education, and marital status of the household head, household size and variables of household composition (number of individuals between 6 and 10 years of age, between 11 and 18 years old, between 19 and 45 years old, between 46 and 60 years old, and more than 60 years old), ownership status of dwelling, rural location, whether the household has piped water in the building, toilet, cooks with wood or coal, quality of the materials of floor and roof, an interviewer-reported variable on the accuracy of reported expenditures (dummy for excellent accuracy), and a dummy controlling for whether the household expenditures were reported by the same respondent in the different waves.

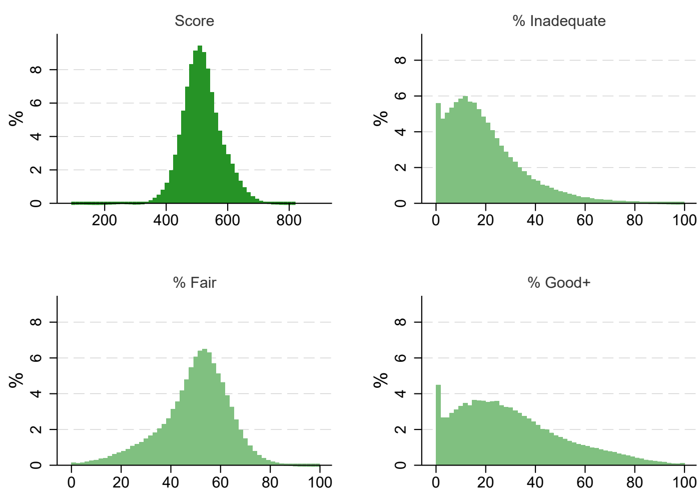
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parenthesis. Robust standard errors clustered at the municipality level in brackets.

Figure A.1: Distribution of test scores (ENLACE data)

(a) Mathematics

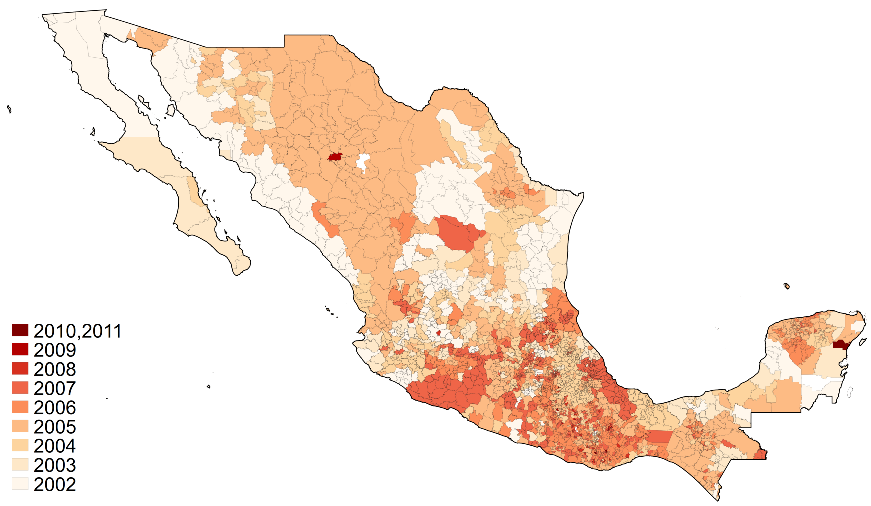


(b) Verbal



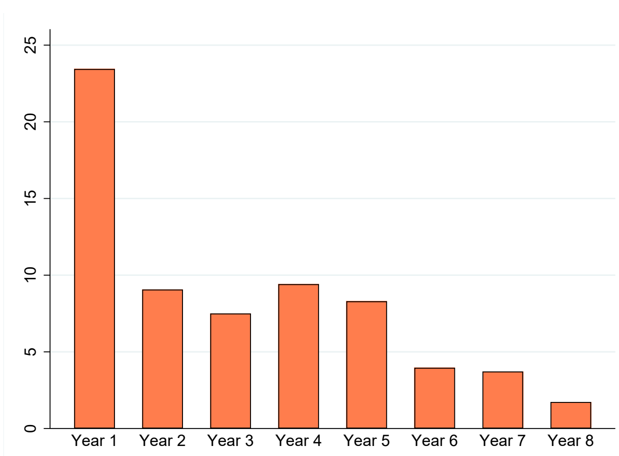
Source: Evaluación Nacional de Logros Académicos (ENLACE). Ministry of Education (SEP).

Figure A.2: Implementation year of Seguro Popular



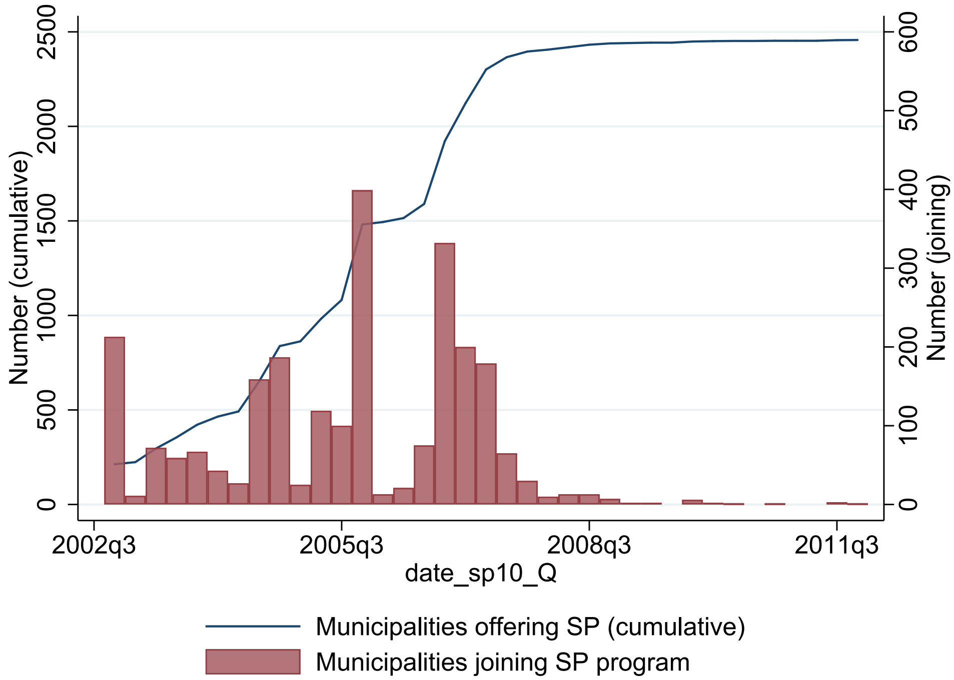
Note: The year of implementation is defined as the first year in which there were at least 10 individuals enrolled in Seguro Popular in a given municipality.

Figure A.3: Coverage rate expansion after Seguro Popular implementation



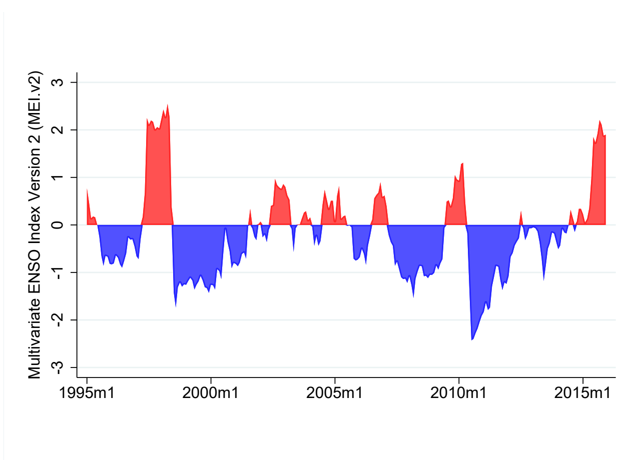
Note: The coverage rate is defined in percentage points. Year 1 displays the Seguro Popular coverage rate after the first year of implementation, the rest of bars display the increase in the coverage rate in each of the consecutive years.

Figure A.4: Quarterly evolution of Seguro Popular implementation



Note: The quarter of Seguro Popular implementation is defined as the first quarter in which there were at least 10 individuals enrolled in the program in a given municipality.

Figure A.5: Variation in the probability of ENSO-induced climatology



Note: The multivariate ENSO (El Niño/Southern Oscillation) index (MEI.v2) measures the probability of ENSO-induced climate variation with the leading combined Empirical Orthogonal Function (EOF) of five different variables over the tropical Pacific basin: sea level pressure, sea surface temperature, zonal and meridional components of the surface wind, and outgoing longwave radiation.

Source: NOAA.

Table A.1: Test score results in Mathematics: Rainfall shock intensity

	(1) Math score SD	(2) Math (Inadequate) pp	(3) Math (Fair) pp	(4) Math (Good+) pp
Rainfall shock(1-2sd)	−0.015**	0.456***	−0.179	−0.278*
	(0.008)	(0.145)	(0.135)	(0.169)
Rainfall shock(2-3sd)	−0.058**	1.571***	−0.359	−1.212**
	(0.026)	(0.520)	(0.351)	(0.529)
Rainfall shock(+3sd)	−0.147***	4.026***	−1.768**	−2.257**
	(0.046)	(1.018)	(0.688)	(0.950)
Rainfall shock(1-2sd) X SP	0.005***	−0.138***	0.056*	0.082**
	(0.002)	(0.033)	(0.032)	(0.037)
Rainfall shock(2-3sd) X SP	0.018***	−0.485***	0.206***	0.280***
	(0.004)	(0.090)	(0.074)	(0.092)
Rainfall shock(+3sd) X SP	0.033***	−0.886***	0.414***	0.472***
	(0.008)	(0.168)	(0.145)	(0.162)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	398,008	398,008	398,008	398,008
# schools	49,751	49,751	49,751	49,751

Note: Rainfall shock(x) denotes whether the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE were between 1-2 standard deviations, 2-3 standard deviations or higher than 3 standard deviations in absolute values from the regional historical mean (since 1950). Rainfall shock(x) X SP is the interaction term of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.2: Test score results in Verbal: Rainfall shock intensity

	(1) Verbal score SD	(2) Verbal (Inadequate) pp	(3) Verbal (Fair) pp	(4) Verbal (Good+) pp
Rainfall shock(1-2sd)	−0.014**	0.358***	−0.151	−0.207
	(0.007)	(0.129)	(0.151)	(0.153)
Rainfall shock(2-3sd)	−0.044*	1.062**	−0.065	−0.998**
	(0.022)	(0.445)	(0.319)	(0.448)
Rainfall shock(+3sd)	−0.109***	2.564***	−0.614	−1.950**
	(0.042)	(0.851)	(0.678)	(0.908)
Rainfall shock(1-2sd) X SP	0.004**	−0.103***	0.040	0.063*
	(0.002)	(0.029)	(0.033)	(0.033)
Rainfall shock(2-3sd) X SP	0.014***	−0.325***	0.076	0.249***
	(0.004)	(0.076)	(0.065)	(0.083)
Rainfall shock(+3sd) X SP	0.026***	−0.604***	0.259*	0.345**
	(0.007)	(0.143)	(0.138)	(0.155)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	398,008	398,008	398,008	398,008
# schools	49,751	49,751	49,751	49,751

Note: Rainfall shock(x) denotes whether the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE were between 1-2 standard deviations, 2-3 standard deviations or higher than 3 standard deviations in absolute values from the regional historical mean (since 1950). SP (coverage rate) is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Rainfall shock(x) X SP is the interaction term of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.3: Test score results: Asymmetry of shocks

	(1) Score (SD)	(2) Inadequate (pp)	(3) Fair (pp)	(4) Good+ (pp)
Panel A: Mathematics				
Excess Rainfall shock	0.001	0.236	−0.109	−0.126
	(0.011)	(0.197)	(0.184)	(0.227)
Shortage Rainfall shock	−0.047***	1.059***	−0.401*	−0.659**
	(0.013)	(0.277)	(0.239)	(0.268)
Excess Rainfall shock X SP	−0.001	−0.010	0.027	−0.016
	(0.002)	(0.046)	(0.044)	(0.050)
Shortage Rainfall shock X SP	0.015***	−0.394***	0.154***	0.240***
	(0.002)	(0.050)	(0.052)	(0.056)
Panel B: Verbal				
Excess Rainfall shock	−0.002	0.265*	−0.070	−0.195
	(0.010)	(0.158)	(0.175)	(0.207)
Shortage Rainfall shock	−0.039***	0.682***	−0.277	−0.406*
	(0.012)	(0.255)	(0.247)	(0.221)
Excess Rainfall shock X SP	0.000	−0.022	0.001	0.021
	(0.002)	(0.037)	(0.039)	(0.044)
Shortage Rainfall shock X SP	0.012***	−0.267***	0.111**	0.156***
	(0.002)	(0.045)	(0.052)	(0.047)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	398,008	398,008	398,008	398,008
# schools	49,751	49,751	49,751	49,751

Note: Excess Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE exceeded in 1 standard deviation the regional historical mean (since 1950), and Shortage Rainfall shock is a dummy that equals 1 when the precipitations were 1 standard deviation below. Excess Rainfall shock X SP and Shortage Rainfall shock X SP are the interaction terms of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.4: Test score results in Mathematics: Intensity and asymmetry of rainfall shocks

	(1) Math score SD	(2) Math (Inadequate) pp	(3) Math (Fair) pp	(4) Math (Good+) pp
Rainfall(Flood)	−0.042	0.911*	0.213	−1.124*
	(0.028)	(0.531)	(0.363)	(0.580)
Rainfall(Above normal)	0.008	0.092	−0.113	0.021
	(0.010)	(0.183)	(0.180)	(0.215)
Rainfall(Below normal)	−0.040***	0.786***	−0.193	−0.593**
	(0.013)	(0.279)	(0.235)	(0.274)
Rainfall(Drought)	−0.082	4.381***	−3.934***	−0.448
	(0.055)	(0.931)	(0.840)	(1.120)
Rainfall(Flood) X SP	0.009*	−0.208*	0.057	0.151
	(0.005)	(0.107)	(0.086)	(0.111)
Rainfall(Above normal) X SP	−0.003	0.039	0.007	−0.046
	(0.002)	(0.044)	(0.042)	(0.051)
Rainfall(Below normal) X SP	0.012***	−0.297***	0.089*	0.208***
	(0.003)	(0.053)	(0.050)	(0.057)
Rainfall(Drought) X SP	0.029***	−1.088***	0.761***	0.327**
	(0.008)	(0.133)	(0.139)	(0.165)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	398,008	398,008	398,008	398,008
# schools	49,751	49,751	49,751	49,751

Note: Rainfall(Flood) = 1 if precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above 2 standard deviations from the regional historical mean (since 1950), Rainfall (Above normal) between 1 and 2 standard deviations, Rainfall (Below normal) between -1 and -2 standard deviations, and Rainfall Drought below -2 standard deviations. Rainfall(x) X SP is the interaction term of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.5: Test score results in Verbal: Intensity and asymmetry of rainfall shocks

	(1) Verbal score SD	(2) Verbal (Inadequate) pp	(3) Verbal (Fair) pp	(4) Verbal (Good+) pp
Rainfall(Flood)	−0.033	0.797*	0.046	−0.843*
	(0.025)	(0.472)	(0.342)	(0.485)
Rainfall(Above normal)	0.004	0.156	−0.052	−0.104
	(0.010)	(0.147)	(0.175)	(0.196)
Rainfall(Below normal)	−0.033***	0.535**	−0.226	−0.309
	(0.012)	(0.260)	(0.247)	(0.225)
Rainfall(Drought)	−0.050	1.984**	−1.042	−0.944
	(0.049)	(0.811)	(0.863)	(1.033)
Rainfall(Flood) X SP	0.008*	−0.173*	0.063	0.110
	(0.005)	(0.092)	(0.079)	(0.099)
Rainfall(Above normal) X SP	−0.001	0.015	−0.024	0.009
	(0.002)	(0.035)	(0.039)	(0.044)
Rainfall(Below normal) X SP	0.009***	−0.210***	0.094*	0.117**
	(0.002)	(0.049)	(0.052)	(0.048)
Rainfall(Drought) X SP	0.021***	−0.606***	0.255*	0.351**
	(0.007)	(0.122)	(0.138)	(0.150)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	398,008	398,008	398,008	398,008
# schools	49,751	49,751	49,751	49,751

Note: Rainfall(Flood) = 1 if precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above 2 standard deviations from the regional historical mean (since 1950), Rainfall (Above normal) between 1 and 2 standard deviations, Rainfall (Below normal) between -1 and -2 standard deviations, and Rainfall Drought below -2 standard deviations. Rainfall(x) X SP is the interaction term of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.6: Test score results: Rural localities

	(1) Score (SD)	(2) Inadequate (pp)	(3) Fair (pp)	(4) Good+ (pp)
Panel A: Mathematics				
Rainfall shock	−0.016	0.610***	−0.524**	−0.086
	(0.011)	(0.234)	(0.224)	(0.230)
Rainfall shock X SP	0.006***	−0.206***	0.144***	0.063
	(0.002)	(0.042)	(0.046)	(0.043)
Panel B: Verbal				
Rainfall shock	−0.015	0.428**	−0.453**	0.025
	(0.011)	(0.217)	(0.214)	(0.212)
Rainfall shock X SP	0.005***	−0.151***	0.115***	0.036
	(0.002)	(0.039)	(0.043)	(0.040)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	162,536	162,536	162,536	162,536
# schools	20,317	20,317	20,317	20,317

Note: Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above or below 1 standard deviation from the regional historical mean (since 1950). Rainfall shock X SP is the interaction term of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.7: Test score results: Small Urban localities

	(1) Score (SD)	(2) Inadequate (pp)	(3) Fair (pp)	(4) Good+ (pp)
Panel A: Mathematics				
Rainfall shock	−0.015	0.164	0.069	−0.233
	(0.011)	(0.175)	(0.183)	(0.248)
Rainfall shock X SP	0.003	−0.022	−0.048	0.070
	(0.003)	(0.039)	(0.042)	(0.057)
Panel B: Verbal				
Rainfall shock	−0.013	0.115	0.079	−0.194
	(0.011)	(0.168)	(0.170)	(0.238)
Rainfall shock X SP	0.003	−0.019	−0.045	0.064
	(0.003)	(0.037)	(0.040)	(0.054)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	83,880	83,880	83,880	83,880
# schools	10,485	10,485	10,485	10,485

Note: Small urban localities are urban localities with less than 50,000 inhabitants. Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above or below 1 standard deviation from the regional historical mean (since 1950). Rainfall shock X SP is the interaction term of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.8: Test score results: Large Urban localities

	(1) Score (SD)	(2) Inadequate (pp)	(3) Fair (pp)	(4) Good+ (pp)
Panel A: Mathematics				
Rainfall shock	0.002	0.053	0.190	−0.243
	(0.013)	(0.149)	(0.217)	(0.300)
Rainfall shock X SP	0.002	0.004	−0.152	0.147
	(0.006)	(0.072)	(0.093)	(0.130)
Panel B: Verbal				
Rainfall shock	0.006	0.012	0.064	−0.077
	(0.013)	(0.151)	(0.185)	(0.274)
Rainfall shock X SP	−0.001	0.045	−0.091	0.046
	(0.006)	(0.074)	(0.082)	(0.128)
School FE	Yes	Yes	Yes	Yes
State-Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	150,968	150,968	150,968	150,968
# schools	18,871	18,871	18,871	18,871

Note: Large urban localities are urban localities with more than 50,000 inhabitants. Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above or below 1 standard deviation from the regional historical mean (since 1950). Rainfall shock X SP is the interaction term of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.9: Determinants of timing of Seguro Popular implementation

	Quarter of SP implementation			
	(1)	(2)	(3)	(4)
Population (log)	−1.047	−1.210	−1.047	−1.210
	(0.112)***	(0.106)***	(0.112)***	(0.106)***
Marginalization Index	0.413	0.268	0.413	0.268
	(0.173)**	(0.157)*	(0.173)**	(0.157)*
Share of elegible individuals	2.485	−2.171	2.484	−2.172
	(0.643)***	(0.624)***	(0.643)***	(0.624)***
Political party alignment	−3.152	−1.494	−3.152	−1.494
	(0.295)***	(0.305)***	(0.295)***	(0.305)***
Doctors per elegible (100,000)				
In Outpatient Units	−0.007	−0.004	−0.007	−0.004
	(0.001)***	(0.001)***	(0.001)***	(0.001)***
In Inpatient Units	−0.004	−0.002	−0.004	−0.002
	(0.001)***	(0.001)**	(0.001)***	(0.001)**
Evolution in Primary Education				
Pass rate growth 96-01 (annual %)	0.324	0.285		
	(0.214)	(0.197)		
Completion rate growth 96-01 (annual %)			0.325	0.287
			(0.214)	(0.197)
Primary educ. info missing	2.497	0.400	2.497	0.402
	(0.365)***	(1.277)	(0.365)***	(1.277)
State FE	No	Yes	No	Yes
Observations	2,426	2,426	2,426	2,426
R^2	0.314	0.549	0.314	0.549

Note: The timing of implementation is measured in quarters. All variables are defined at the municipality level (the unit of implementation). The population, marginalization index, and the share of eligible individuals are measured in the year 2000. The number of doctors is measured in the year 2001 (the first available). The pre-program indicators of the evolution in primary education are measured as the annual growth rate observed between 1996 and 2001.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.10: Determinants of Seguro Popular coverage rate expansion

	First Year		Second Year		Third Year	
	(1)	(2)	(3)	(4)	(5)	(6)
Population (log)	−3.884	−3.883	−1.008	−1.008	−0.260	−0.261
	(0.417)***	(0.417)***	(0.283)***	(0.283)***	(0.245)	(0.245)
Marginalization Index	2.068	2.067	0.931	0.932	−0.767	−0.767
	(0.780)***	(0.780)***	(0.575)	(0.575)	(0.490)	(0.490)
Share of elegible individuals	33.247	33.242	7.976	7.977	4.993	4.994
	(2.295)***	(2.295)***	(1.900)***	(1.899)***	(1.553)***	(1.552)***
Political party alignment	0.673	0.673	−0.372	−0.372	−0.846	−0.847
	(0.939)	(0.939)	(0.522)	(0.522)	(0.529)	(0.529)
Doctors per elegible (100,000)						
In Outpatient Units	0.030	0.030	−0.004	−0.004	−0.005	−0.005
	(0.007)***	(0.007)***	(0.003)	(0.003)	(0.003)	(0.003)
In Inpatient Units	0.008	0.008	−0.004	−0.004	0.003	0.003
	(0.005)*	(0.005)*	(0.002)	(0.002)	(0.002)	(0.002)
Evolution in Primary Education						
Pass rate growth 96-01 (annual %)	0.993		0.545		−0.357	
	(0.878)		(0.624)		(0.480)	
Completion rate growth 96-01 (annual %)		1.009		0.541		−0.360
		(0.877)		(0.624)		(0.480)
Primary educ. info missing	−4.067	−4.053	5.227	5.224	3.510	3.508
	(4.480)	(4.479)	(4.516)	(4.515)	(3.074)	(3.074)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,426	2,426	2,426	2,426	2,426	2,426
R^2	0.384	0.384	0.132	0.132	0.121	0.121

Note: The coverage rate is defined in percentage points. Dependent variable in columns "First Year" is the increase in the coverage rate in the first year of SP implementation; "Second Year", the increase in the coverage rate in the second year; "Third Year", the increase in the coverage rate in the third year. All variables are defined at the municipality level (the unit of implementation). The population, marginalization index, and the share of eligible individuals are measured in the year 2000. The number of doctors is measured in the year 2001 (the first available). The pre-program indicators of the evolution in primary education are measured as the annual growth rate observed between 1996 and 2001.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.11: Test score trends and SP expansion

	Mathematics		**Verbal**	
	(1) Test score SD	(2) Test score SD	(3) Test score SD	(4) Test score SD
SP coverage increase (07-08)	−0.000	−0.001	0.000	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
State FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
# schools	13,285	20,946	13,285	20,946

Note: Dependent variable: Variation in test scores between 2006 and 2007 (difference in standardized test scores). Independent variable: variation in the SP coverage rate between 2007 and 2008 (in percentage points). Columns 1 and 3: sample of municipalities with SP coverage rate below 5% in 2007. Columns 2 and 4: sample of municipalities with SP coverage rate below 10% in 2007. Controls include the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.12: Endogenous responses

	(1) Dropout rate (pp)	(2) Students evaluated
Rainfall shock	0.006	0.339
	(0.043)	(0.338)
Rainfall shock X SP	−0.005	−0.080
	(0.008)	(0.063)
School FE	Yes	Yes
State-Year FE	Yes	Yes
Controls	Yes	Yes
Mean depvar	3.41	136.86
Observations	391,841	398,008
# schools	49,428	49,751

Note: The dropout rate records the proportion of students leaving the school during the academic year (in percentage points). Students evaluated records the number of students sitting the ENLACE evaluation. Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the school-locality during the 12 months preceding the evaluation date of ENLACE are above or below 1 standard deviation from the regional historical mean (since 1950). Rainfall shock X SP is the interaction term of the rainfall shock with the SP coverage rate (which is calculated by dividing the number of affiliates to Seguro Popular in the municipality by its population size, and scaled up by a factor of 10 so that a value of 10 represents full coverage). Controls include the SP coverage rate, the number of students per teacher, the number of students per group, the share of girls, whether the head of the school also teaches, whether the school participates in the Safe School, Extending School Hours, or Quality Schools programs, 5 dummies of marginalization level of the school, the share of students with unreliable test results, 7 dummies of municipality size, municipality per capita expenses in the Progresa/Oportunidades program, and the municipality homicide rate.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the municipality level in parentheses.

Table A.13: Children's health and time use by area type

	Sick		Caring		Chores	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Rural						
Rainfall shock	0.065	0.064	0.136	0.139	0.093	0.124
	(0.028)**	(0.029)**	(0.042)***	(0.042)***	(0.053)*	(0.054)**
	[0.042]	[0.040]	[0.083]	[0.080]*	[0.070]	[0.071]*
Rainfall shock X SP(years)	−0.016	−0.015	−0.027	−0.028	−0.026	−0.032
	(0.006)***	(0.006)**	(0.008)***	(0.008)***	(0.011)**	(0.011)***
	[0.008]*	[0.008]*	[0.014]*	[0.014]*	[0.013]*	[0.013]**
Observations	2644	2620	2676	2652	2676	2652
R^2	0.026	0.031	0.052	0.075	0.167	0.179
Panel B: Urban						
Rainfall shock	0.054	0.045	−0.020	−0.005	0.102	0.070
	(0.034)	(0.036)	(0.043)	(0.044)	(0.056)*	(0.058)
	[0.043]	[0.043]	[0.047]	[0.050]	[0.080]	[0.079]
Rainfall shock X SP(years)	−0.011	−0.010	0.001	−0.001	−0.029	−0.022
	(0.007)	(0.007)	(0.009)	(0.009)	(0.012)**	(0.012)*
Observations	3148	3100	3183	3134	3183	3134
R^2	0.011	0.021	0.052	0.070	0.138	0.149
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes
Additional controls	No	Yes	No	Yes	No	Yes

Note: Sick is a binary variable equal to one if the child stopped doing any of her daily activities due to sickness in the past four weeks. Caring is a dummy variable recording whether the child took care of elderly or sick people and/or other children in the last week. Chores is a dummy variable equal to one if the child did domestic chores in the past week. Rainfall shock is a dummy variable that equals 1 when the precipitations gathered in the municipality of residence during the 12 months preceding the interview date were above or below 1 standard deviation from the regional historical mean. Rainfall shock X SP(years) is the interaction term of Rainfall shock with the number of years a child had Seguro Popular available. The basic controls are the number of years a child had Seguro Popular available, dummies for year and month of interview, child's age, and gender. Additional controls include whether the child speaks an indigenous language, four categories of father's and mother's education: no education, secondary, and high school or higher, the age, gender, and marital status of the household head, ownership status of dwelling, whether the household has piped water into the house, toilet, cooks with wood or coal, and indicators of the quality of the materials of the floor and roof. Robust standard errors in parenthesis.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parenthesis. Robust standard errors clustered at the municipality level in brackets.