Informality and the Expansion of Social Protection Programs

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Informality and the Expansion of Social Protection Programs: Evidence from Mexico

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Abstract

We examine the impact of health benefits on labor mobility and wages in a developing country. Seguro Popular provides health services to the uninsured in Mexico. Using the gradual roll-out of the system at the municipality level, we estimate that Seguro Popular did not increase overall informality, and did not affect wage gains for workers who switch between the formal and the informal sector. Thus, extending health benefits to uncovered workers does not significantly increase labor supply distortions. To the extent that marginal workers do not value health insurance, financing health insurance through payroll taxes may increase informality.

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Introduction

When health benefits are tied to jobs, they have the potential to distort labor supply. Workers may fail to take jobs where they are more productive and earn higher wages because those jobs do not provide health insurance. One incarnation of this labor market distortion is "job lock", whereby workers in a job with health insurance are less likely to leave that job. Another incarnation of this same problem is that workers may avoid becoming self-employed because they would have to buy their own health insurance at a higher cost than group insurance. The empirical evidence for both phenomena is mixed (Gruber and Madrian, 2002, Gumus and Regan, 2009, Heim and Lurie, 2010). Similarly, while the theory of compensating wage differentials predicts that jobs with health insurance pay lower wages, existing studies do not provide strong evidence for a health insurance compensating wage differential (Pauly, 2001, Lehrer and Pereira, 2007).

This paper analyzes the impact of health benefits on labor mobility and wages in a developing country, Mexico. As in many middle income countries, health insurance in Mexico used to be tied to payroll contributions. More than half of Mexican workers went uncovered because they worked in informal jobs (Perry et al., 2007), i.e. jobs that do not pay social security contributions. To address this lack of coverage, Mexico introduced a new health benefit system, Seguro Popular (SP), starting in 2002. SP covers all individuals that are not affiliated with the formal health insurance system based on payroll contributions, and it is in practice free to the overwhelming majority of workers. SP was rolled out progressively at the municipality level, and the government predicts the program will reach full coverage of the Mexican population in 2011. By increasing the benefits of working informally, SP incentivizes workers to remain or become informal. An increase in informality generates two key issues. First, by working informally, workers are deprived of formal benefits other than health insurance, such as retirement pensions. Second, the cost of SP will be higher if informality increases, as the additional informal workers become eligible for SP. In the US context, this issue has been analyzed under the name

of crowd out, the idea being that workers who would have paid for private health insurance in the absence of the public scheme prefer to take up the public scheme when the latter becomes available. There has been much debate about whether public health insurance crowds out private health insurance in the US, but some of the most recent work indicates that crowd out is an important phenomenon (Gruber and Simon 2008). Extrapolating from the US context, we may expect informality in Mexico to increase after the introduction of SP[2], causing the cost of the public health scheme to become much greater than anticipated. Additional taxes may need to be levied on the formal sector in order to finance the program, leading to further distortions. This paper sheds light on the severity of these issues by examining the impact of Seguro Popular on informality.

We first show that the level of informality in a municipality prior to the introduction of Seguro Popular does not determine when Seguro Popular is eventually introduced. We then analyze the impact of Seguro Popular on informality using panel regression. Seguro Popular does not significantly increase informality, and this result is robust to several definitions of informality. When using our preferred definition of informality, i.e. having no formal health insurance or being self-employed, the increase is on the order of 1 percentage point and is not significant over the whole employed population. However, if we restrict the sample to workers with less than nine years of schooling, we find that Seguro Popular was associated with a significant 0.9 percentage point increase in informality (60% of workers are informal in this group). Slightly larger significant increases in informality are found when the sample is further restricted to married workers with children, or to workers over 34 years old. The heterogeneity in the impact is likely explained by the fact that some workers are more sensitive to the availability of health insurance when deciding to work formally or informally. Additionally, the small size of the effect

[2] There is one important difference between the US and Mexican context that lowers the expected amount of crowd out generated by SP in Mexico. Indeed, in the US, it is generally legal for an individual or firm to drop private health insurance. By contrast, in Mexico, health insurance contributions are mandatory. In order to drop coverage, a firm has to become entirely informal, which can have large costs in terms of fines and lack of access to formal credit markets. It would be easier for individual workers to move to informal jobs, but that is still more costly than staying in the same job and just dropping health insurance, an option typically open to American workers.

suggests that marginal workers do not choose between formal and informal jobs based on the availability of health insurance. If workers who move between the formal and the informal sector value health insurance benefits, one would expect, all other things equal, to see a decrease in the wage differential between the formal and the informal sector after the introduction of SP. We analyze the impact of SP on wage gains for workers moving from the formal to the informal sector, as well as for movers in the opposite direction. We find no significant effect of SP on wage gains for either direction of the move. The absence of an effect on wages is consistent with marginal workers placing little to no value on health benefits[3]. Finally, since *Oportunidades* was introduced in urban areas during the same period as Seguro Popular, we examine both programs together. *Oportunidades* is a means-tested conditional cash transfer. As such, the program may incentivize workers to work informally in order to conceal income more easily and pass the means test. We find that *Oportunidades* did not have a significant impact on informality, and controlling for the introduction of *Oportunidades* does not affect the results for SP.

These findings should be reassuring to policy makers: *Seguro Popular* offers workers protection against catastrophic health expenditures with minimal distortion of labor supply decisions. These results thus make it more likely that *Seguro Popular* is welfare improving. However, to the extent that marginal workers do seem to value health benefits, health insurance financing through payroll taxation may create labor market distortions. If marginal workers do not value health insurance, making payroll contributions for health mandatory may result in these marginal workers choosing to work informally rather than pay for a benefit that they do not value.

This paper makes three key contributions to the existing literature. Our first contribution relates to the impact of health insurance on labor mobility and wages. The US literature has found mixed results on both of these outcomes, with papers identified off policy experiments generally finding results more

[3] We also examine alternative explanations for the absence of an impact on wages below.

supportive of a negative impact of health insurance on labor mobility (Gruber and Madrian, 1994) and wages (Gruber, 1994). Using a policy experiment which entails a change in the cost of health insurance that is arguably much larger than the changes used in US studies, we do not find evidence that extending health insurance coverage increases job mobility or reduces wages of covered workers in the Mexican labor market. Our results are consistent with a reverse job lock phenomenon: workers in jobs without health insurance are unwilling to take jobs with health insurance because the cost of insurance is higher than its perceived benefits. Finally, our results also imply that there is no crowd out generated by SP in Mexico. Our second contribution is to the specific debate on the impact of Seguro Popular on informality (Levy, 2008). Working papers looking at the early years of the introduction of SP (Campos-Vasquez and Knox, 2008, and Barros, 2009) failed to find any significant effect of the program. Our time frame allows us to look at long-run impacts and we show that, while there is indeed a significant increase in informality for less educated workers, the effect is small and does not increase over time. Additionally, our data on the wages of workers who switch between formal and informal jobs allows us to understand why the effect of SP on informality is so limited. Our results are consistent with workers who are close to indifferent between working formally and informally placing little to no value on health benefits. A very recent working paper by Bosch and Campos-Vazquez (2010) uses administrative data to look at the long-run impact of SP on formal employment. They also find a limited decline in formal employment, but because they do not have data on individuals working in the informal sector, they are unable to further analyze the impact of SP on wages. The third key contribution of this paper is to examine for the first time the impact of the urban expansion of *Oportunidades* on informality. We find that *Oportunidades* had no significant impact on informality.

The remainder of the paper is organized as follows. First we provide some institutional background on *Seguro Popular* and *Oportunidades* and discuss their potential impact on informality. Second, we present the data. We then examine the results in four stages. We start with establishing whether the

timing of the introduction of Seguro Popular was related to informality and other characteristics of municipalities. Second, we analyze the impact of Seguro Popular on workers' propensity to hold informal jobs. Third, we look at whether Seguro Popular affects transitions between formal and informal jobs. Fourth, we examine the impact of the introduction of Seguro Popular on wage changes for workers who move between formal and informal jobs. Finally, we conclude.

The Mexican Social Protection System and Informality: Institutional Background and Theoretical Framework

Seguro Popular

Before the introduction of Seguro Popular, access to health institutions in Mexico was primarily linked to formal employment and covered on the basis of payroll taxes supported by employees and employers. Two institutions were the main providers of services to workers affiliated via their employers, *Instituto Mexicano del Seguro Social* (IMSS) and *Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado* (ISSSTE). Individuals without formal employment had access only to services provided by the Ministry of Health (SS) or private medical services; these individuals represent half of the total population of the country. The services provided by the SS did not ensure access to a package of services and medical procedures and user fees were required for medications and some medical services. Thus, in the event of a health shock, uninsured individuals could face catastrophic health costs or chose not to seek medical attention at all.

In order to address this situation, in 2002 the Mexican federal government introduced a pilot program called *"Programa de Salud para Todos,"* known as *Seguro Popular de Salud,* to provide health coverage to individuals not covered by social security. The success of this pilot convinced the authorities to create the System of Social Protection in Health in 2004. Popular Health Insurance, or Seguro Popular (SP), subsidizes an explicit set of health interventions. The main eligibility requirement for the program is not

being insured by health institutions serving the formal sector (mainly IMSS and ISSSTE). Thus individuals who are informal salaried workers, self-employed, or not economically active may qualify. In theory, there is a progressive SP premium. In reality, only two percent of the total beneficiaries make any payment (CNPSS, 2009). As a result, health spending has increased substantially to cover the costs of increased demand for health services and to increase system capacity: between 2000 and 2010, the non-contributory public expenditure in health increased 5.6 percent annually on average. The average total per capita expenditure increased from 1,080 to 1,620 pesos of 2010.[4] The federal authorities pay for most of the costs of SP but state governments also play a key role in the coverage and functioning of the system (see appendix 2 for more details). A final feature to note is that the beneficiaries of other federal social programs, particularly *Oportunidades,* can become automatically affiliated with *Seguro Popular.*

Prior research on the effects of Seguro Popular has mainly focused on its effect on health and health care expenditures. There is no conclusive evidence of an impact of SP on health (Barros, 2009). However, utilization of health care services did increase after the introduction of SP (Gakidou et al, 2006). Out of pocket health care expenditures decreased after the introduction of SP (Barros, 2009, Gakidou et al , 2006, Galarraga et al, 2010), and catastrophic health care expenditures also decreased (Gakidou et al, 2006, King et al, 2009, Galarraga et al, 2010). Thus, Seguro Popular decreased spending on health services by previously uncovered individuals and increased the consumption of health services. This shows that there is substantial value provided to workers covered by Seguro Popular, which implies that Seguro Popular should make informality more attractive.

Progresa-Oportunidades

The other component of the Mexican Social Protection System is an income redistribution strategy based on a conditional cash transfer. The program, *Programa de Educación, Salud y Alimentación*

[4] These estimates are based on the Annual Presidential Report to Congress, 2011.

(Progresa), started in 1997 as the principal anti-poverty program of the Mexican government. Progresa changed its name to Oportunidades in 2002 after the last rural expansion. This change also included the expansion to semi-urban and urban areas. Not all people living in urban areas are poor, so federal authorities changed the coverage rules for urban areas. The program is advertised in villages using various media, and those families interested in being covered visit the modules to apply for the program. These modules are open for no more than four weeks and families must provide the full information used to determine if they are eligible according to the official poverty threshold. Only 40% of the potentially eligible people applied (Behrman et al., 2009). After this initial enrollment phase, very few additional households joined the program. The urban expansion of Oportunidades took place in 2002 through 2005, while the introduction of Seguro Popular started in 2002 and is still ongoing. The overlap between the expansion periods of Oportunidades and Seguro Popular makes it important to include Oportunidades in our analysis.

Informality in Mexico

There is no official definition of informality. The Mexican Federal Labor Law makes no distinctions among economic activities and requires all workers in all sectors of the economy to be included in the formal social security system. Formal workers contribute to one of the social security systems, IMSS or ISSSTE. The first is mainly for workers in the private sector and the second for public employees. IMSS provides insurance for health and maternity, old age retirement, severance at old age, disability, life, child-care services and workers compensation. Workers contributing to IMSS must also contribute to an individualized housing fund managed by an agency called INFONAVIT. The distribution contributions among employers, employees and the federal government are described in Appendix 2. Total contributions are equivalent to 31.5 percent of total wage on average. Every type of insurance has its own contribution limits.

Given the lack of official definition of informality we decided to use several definitions of informality based on the requirements to be covered by Seguro Popular. The Federal Law on Health clearly states that all individuals not covered by any of the social security systems or without access to health services can be covered by Seguro Popular.[5] We use the following definitions:

1. No health or self-employed: workers who declared either being salaried workers not covered by social security, or being self-employed.
2. Self-employed.
3. Small firm: workers who declared to be employed in firms with less than 5 employees.
4. No Contract: workers who declared that they had not signed a contract in their current job.

[5] The Federal Health Law says, "Article 77 bis 3.- All households and people not covered by social security institutes or having no health coverage will be included in the System for Social Protection in Health according to their official address. This will guarantee access to all health services provided by the law." (Translation by the authors).

The first definition is our preferred one for two reasons. First, since contributing to formal health insurance is required by law, this clearly identifies a group of workers who are not complying with formal requirements. By contrast, other measures do not directly capture this element of non compliance: for example, even though workers in small firms are often informal, some of these workers may contribute to the formal social security system. Second, the most direct impact of SP should be to incentivize workers to drop formal health coverage. This is why definition 1 defines as informal anyone who is salaried and does not have formal health coverage. We add to this definition the self-employed, since the question about health coverage is not asked of them, and they are in practice unlikely to contribute to formal health insurance. Using the first definition, the average size of informality is around 50% (Table 1). This will facilitate our analysis, since linear probability and probit models have the same point estimates when the average value of the variable is close to 0.5.

Theoretical framework

Seguro Popular is a health benefit that is given to those who work informally (without formal health benefits) or do not work at all. Since this paper considers the impact of *Seguro Popular* on informality, we concentrate on the choice between working in the formal versus the informal sector and ignore the choice of being out of the labor force[6]. Assume that the utility of working in a formal job is given by $U_f = w_f + \alpha b_f$ where w_f is the wage in the formal sector, b_f are non-pecuniary benefits in the formal sector, and $\alpha \leq 1$ is the value that workers place on non-pecuniary benefits. Similarly, the utility of working in the informal sector is $U_i = w_i + \alpha b_i$. A worker chooses to work in the informal sector if $U_i - U_f > 0$, i.e. if $w_i - w_f + \alpha(b_i - b_f) > 0$

Seguro Popular increases the value of b_i and hence the utility of working informally relative to the utility of working formally. In other words, Seguro Popular should, all else equal, increase the proportion of informal workers by encouraging formal workers to become informal and discouraging informal workers from becoming formal. Given the substantial flows between the formal and the informal sector in Mexico (Bosch and Maloney, 2007), both mechanisms should be relevant.

However, the size of the effect of *Seguro Popular* on informality may in practice depend on a few additional considerations. First, even prior to *Seguro Popular*, workers without health coverage could access public clinics and benefited from a small health care subsidy. *Seguro Popular* makes this subsidy much more substantial and systematic. As of 2009, the cost of Seguro Popular was 1,645.3 pesos per enrolled person,[7] which represents 5% of an average worker's yearly wages. This amount is substantial. For reference, the share of health insurance costs out of total compensation for the US is6.7% (Gruber and Madrian, 2002). Second, the impact of *Seguro Popular* on informality depends on how large α is:

[6] In practice, Seguro Popular does not affect labor force participation. We have repeated the analysis of Table 3 using labor force participation as the left-hand side variable and found that the impact of Seguro Popular on labor force participation is both very small and statistically insignificant.

[7] Source: Comision Nacional de Protección Social en Salud. Informe 2010.

the more workers value non-pecuniary benefits, the larger the impact. This suggests that older workers, whose health tends to be poorer, may be more likely to become (or stay) informal after the introduction of *Seguro Popular*. Additionally, in Mexico, formal sector workers can provide health coverage for their family. Thus, the value of benefits is higher for the first family member who works formally, and so there is a stronger incentive for primary earners with larger families to work in the formal sector. Thus we expect the impact of *Seguro Popular* on informality to be stronger for workers who are heads of households and married with children. Third, the impact depends on how many workers are close to indifferent between working in the informal versus the formal sector, and could thus be swayed by a change in benefits in the informal sector. The fact that there are many workers who switch from the formal to the informal sector and vice-versa suggests that many workers may be close to indifferent between the two sectors, and therefore that the effect of Seguro Popular on informality may be large. Fourth, we expect that informality will increase more for less educated workers when Seguro Popular is introduced, as these workers are more likely to be informal to start with. Highly qualified workers such as engineers would typically work for larger, formal firms. We expect such workers to have fewer opportunities to practice their trade informally than, say, a salesperson. To summarize, we expect Seguro Popular to increase informality, and this effect should be larger for less educated workers, older workers, and for household heads married with children.

In the empirical analysis, we will also examine the impact of Seguro Popular on transitions between the formal sector, the informal sector, and non-employment, as well as on the wages of workers who move between the formal and the informal sectors. The rationale for looking at transitions is that if informality became more attractive after the introduction of Seguro Popular, we may expect to see more transitions from formality to informality and fewer transitions in the reverse direction. Additionally, it is interesting to look at whether the expected increase in informality after the introduction of SP comes from an increase in the transitions from formality to informality, or from non employment to informality.

We investigate empirically the impact of the introduction of SP on the wages of job switchers. For a worker, to switch from the formal to the informal sector, we must have $w_i - w_f > \alpha(b_f - b_i)$. The left hand side is the wage gain from moving to informality. When SP is introduced, b_i increases. This implies that, as long as $\alpha > 0$, the wage gain from moving from the formal to the informal sector should be lower after the introduction of SP. In other words, if workers value health benefits, the wage gain from moving from the formal to the informal sector should be lower after the introduction of SP (and conversely the wage gain from moving the formal sector should be higher).

The simple theoretical framework developed above assumes that workers have a choice between holding a formal or an informal job. Models of segmented or dual labor markets question this assumption. If wages in the formal sector are set above market-clearing levels, rationing ensues, so that there are more workers willing to work formally than formal jobs. In this case, it is less straightforward that providing benefits to informal workers will increase informality. Clearly, in such a model, formal workers would be unwilling to move to an informal job, even after the introduction of SP. On the other hand, if searching for a formal job is costly, informal workers may reduce their search efforts after the introduction of SP, which would result in a lower probability of finding a formal job. Empirically, if the segmented labor market model is valid, we should see no change in the transitions from the formal sector to the informal sector after SP is introduced, but possibly a decline in the transitions from the informal to the formal sector. Overall, in a segmented labor market, the impact of SP on informality would be smaller than in a competitive labor market.

Currently, the literature testing for segmented labor markets versus competitive labor markets indicates that in most countries there are indeed some informal workers who are priced out of the formal labor market, but this is not the case for all informal workers. Self-employed workers, who are typically informal, do not seem to be excluded from the formal labor market; instead, they seem to willingly choose their informal self-employed jobs (Perry et al., 2007). This is particularly true for Mexico, where

self-employed workers earn more than formal sector workers with similar characteristics (Bargain and Kwenda, 2010). Therefore, while segmentation in the Mexican labor market may exist, we can at least use the predictions of the competitive labor market for self-employed workers.

With respect to the impact of Oportunidades on informality, the introduction of the program to urban areas may be associated with higher informality. SP and Oportunidades were introduced during the same time frame in urban areas, so the analysis must clearly differentiate both parts of the Mexican social protection system. Oportunidades has been very successful in the countryside, but there few workers are likely to be at the margin between working formally or informally: most agricultural jobs are informal, and formal jobs are mostly unavailable. As mentioned previously, the program is a conditional cash transfer and it is means-tested. There is some anecdotal evidence that applicants try to pass as poor by hiding their assets when being visited at home by evaluators. Similarly, people may prefer to work informally in order to be able to conceal their income more easily. Thus, the introduction of Oportunidades may be associated with an increase in informality. As in the case of Seguro Popular, we would expect this increase to be larger for groups that are nearly indifferent between working formally and informally. However, the incentive for informality may not fully play out given the short enrollment period: there was little time for people to learn about the program and think of strategies to qualify for it, such as holding an informal job. Still, we feel it is important to test whether the introduction of Oportunidades to urban areas was associated with an increase in informality. Also, Oportunidades was rolled out during roughly the same period as Seguro Popular, and, where Oportunidades was present, it was a key mechanism for enrolling people in Seguro Popular (Scott, 2006). It is thus important to look at the impact of both SP and Oportunidades on informality in order to ascertain which one, if any, had a greater effect.

Data

This paper employs four sets of data: census data for the total population and households, labor surveys, and the roll-out information of *Progresa-Oportunidades* and *Seguro Popular*. The first two datasets are provided by *Instituto Nacional de Estadistica y Geografia* (INEGI), Mexican Bureau of Statistics and the *Consejo Nacional de Población* (CONAPO). The information on *Progresa-Oportunidades* was taken from the historical census of beneficiaries. It was provided by the National Office of Oportunidades (*Coordinacion Nacional de Oportunidades*). The information on *Seguro Popular* was provided by the *Comision Nacional de Proteccion Social en Salud*, the federal agency that coordinates the affiliation and expansion of the program through the country.

Total Population and Households

Our analysis includes demographic information on the population and total number of households at the village level. We estimated the total population for the intra-census periods (the census is established every 5 years) using the compound rate of growth between censuses.[8] This was done for the periods 1991-1994, 1996-1999 and 2001-2004. For the period 2006-2009 we used the official population estimations by CONAPO at the village level. To estimate the total number of households during the period, we assumed the same household size of 2005 and extrapolated it using the information on population.

We restrict the data to villages with more than 20,000 inhabitants, i.e. urban villages. Indeed, the survey we have only consistently covers urban areas. When analyzing the impact of urban Oportundiades, we further restrict the sample to villages with more than 50,000 inhabitants since this was the criterion for inclusion in the urban expansion of Oportunidades.

[8] Each year of data was estimated using the compound rate of growth (crg). Where: $crg = \left(\frac{Value_t}{Value_{t-5}} \right)^{\frac{1}{5}} - 5$

Employment Surveys: ENE and ENOE

The information on employment comes from the Mexican Labor Surveys from 1995 to 2009. For the period 1995-2004, we used the National Employment Survey (ENE) and for the period 2005-2009 we used the National Survey of Occupation and Employment (ENOE), which is the new version of the ENE.

In each of these surveys, every economically active worker of the selected dwellings is interviewed for five consecutive quarters and then replaced by a new representative unit of analysis.[9] To avoid attrition issues, we only used the first interview of every individual for most of our analysis. In our transition and wage analysis, we used the first two interviews.

Other variables

We created a dataset that contains information on the total number of doctors, total number of hospitals and the local total consumption of electricity. This data is recorded by municipality during the period 1995-2009. The yearly growth of electricity consumption was taken as a proxy for the local economic conditions in the municipality. As described by Heckman (2010), formal employment seems to be closely related to economic performance. We created these variables using the state statistical yearbooks for all of the states in Mexico, which include both state and municipal information. The information on doctors and hospitals is reported directly from the state ministries of health and the information on electricity consumption is provided directly by the two public electric companies in Mexico: Compania de Luz y Fuerza del Centro (CLyFC) and Comisión Federal de Electricidad (CFE).[10] Table 1 gives summary statistics. Note that 50% of the population works informally, i.e. has no health benefits or is self-employed. We now turn to the analysis of the impact of these programs on informality.

[9] For more details see INEGI (2007), which contains a comprehensive description of the surveys.
[10] CLyFC was closed down in 2009 and CFE is now the national producer, distributor and retailer of electricity in the country.

Results

Endogeneity analysis

Before examining the impact of Mexico's social protection programs on informality, it is prudent to assess to what degree our identification strategy is valid. Using the timing of the introduction of Seguro Popular as a source of identification assumes that this timing is not correlated with the key outcome of interest, labor market informality. While it is not possible to test directly whether the timing of the introduction of Seguro Popular was endogenous, we can examine whether the year of introduction of Seguro Popular is predicted by observable variables in 2000.

We use a complete set of municipalities' characteristics from the 2000 Census, which occurred prior to the earliest implementation of SP in 2002. As shown in Table 2, we found that municipalities with a higher share of informal workers were covered significantly later than average (column 1). In column 2, we add state-level controls. The reason for doing so is that state governments play a key role in the coverage and functioning of the SP program. The total number of beneficiaries in the program and the corresponding funds to the states are defined by both federal and state governments. Some accounts of the program's implementation suggest that smaller states were covered first (Gonzalez-Pier[2006] and personal interview). The federal authorities first implemented the plan looking for a small scale and, once they verified its functioning, more states were included. We find that indeed municipalities in larger states introduced SP significantly later (column 2). In column 3, we use controls at the municipality level. Under this specification informality becomes insignificant, and all municipal-level controls except for population are also insignificant. Still, we see that larger municipalities introduced SP earlier. Finally, in column 4 we also add state fixed effects. We find that municipalities with more doctors per capita and a higher share of males introduced SP earlier, while municipalities with a more educated workforce introduced SP later. Importantly, once state fixed effects are added, the coefficient on informality is much closer to 0, thus confirming that informality per se is not a significant

determinant of the timing of introduction of SP at the municipality level. In columns 5-8, we repeat the analysis from columns 1-4, but the left-hand side variable is a dummy for the introduction of the program after the pilot phase, i.e. in 2004 or later. The results are qualitatively very similar to those in columns 1-4, with a few notable exceptions. First, the coefficient on the "governor PRD"[11] dummy is significant (column 6), showing that these states were less likely to introduce SP late –the analysis does not include Mexico City, the capital of the country. The Mexican Federal government is mainly located in Mexico City and there was a political dispute over Seguro Popular since its creation. After different negotiations, the local government signed the agreement to start the coverage by 2005, but it remained as the state with the lowest coverage until now. Informality is never found to be a significant determinant of late introduction.

Overall, we conclude that there is no evidence that informality in municipalities determined the timing of the expansion of Seguro Popular. These results support our identification strategy.

The Impact of Seguro Popular on Informality

We estimate linear probability models, regressing the indicator for informality on an indicator for the presence of the program under consideration. We always include municipality fixed effects and report robust standard errors clustered by municipality. Table 3 presents the results for Seguro Popular. In column 1, Seguro Popular is found to have a negative and insignificant effect on informality. In column 2, as controls are added, the effect of Seguro Popular becomes positive but remains insignificant. Note that the demographic controls themselves (age, gender, schooling and sector of work) are associated with informality in the ways described by the literature on informality in Latin America (Perry et al., 2007). In subsequent columns, we focus on sub-groups in the population that are more likely to see their informality status affected by Seguro Popular. We first examine the case of less educated workers, and specifically workers with 9 years of schooling or less (9 years is the median of the schooling

[11] PRD is the acronym of "Partido de la Revolucion Democratica". It is national political party and is considered to the left of the political spectrum.

distribution). We argue that these workers are more likely to have opportunities to work in the informal sector than more educated workers. For less educated workers, Seguro Popular is found to significantly increase informality, both without and with controls (columns 3 and 4). Controlling for relevant covariates, we find that less educated workers are 0.8 percentage points more likely to work informally after the introduction of Seguro Popular (60% of this group works informally on average). The effect of Seguro Popular on males is positive but falls short of statistical significance, once relevant controls are added (column 6). Among less educated workers, the effect of Seguro Popular is stronger for those workers who are household heads married with children (column 8) or over 34 years old (this is the median of the age distribution; see column 10). Thus, as expected, married workers with children are more likely to react to the introduction of Seguro Popular because they would provide health benefits for their whole family if working in the formal sector. The value of health benefits is thus higher for married workers with children than for workers who are only seeking to cover themselves. As for older workers, their health is presumably somewhat worse than the health of younger people and hence the value of health benefits is higher for them, allowing them to choose a more flexible occupation in the informal sector. This could explain why they react more strongly to the introduction of Seguro Popular.

For all three sub-groups where a significant effect of Seguro Popular on informality was found[12], the effect was of the order of 1 percentage point, which is a very small effect (less than 2%) given that more than half the labor force in this groups is informal. One can also see that this effect is small by comparing it to the results from Heim and Lurie (2010). Indeed, Heim and Lurie find that a 7% decline in the price of health insurance when self-employed led to a 10% increase in self-employment in the US. In our case, SP represented an almost 100% decline in the price of insurance (i.e. a health care package similar to the one provided by IMSS became available for free) and yet the impact on informality was overall insignificantly different from 0. This suggests that either Seguro Popular did not provide much value so

[12] Entrepreneurs may also be more sensitive to the incentives introduced by SP. We have analyzed the impact of SP on the informality of business owners, and found no significant effect.

that the increase in health benefits for informal workers was minimal, or that very few workers choose to be formal or informal on the basis of the availability of health benefits. The first explanation is not very plausible. While Seguro Popular did not cover as many procedures initially as employment-related health plans (mostly IMSS), the coverage was expanded substantially over time. Additionally, the quality of care in Seguro Popular was arguably lower than in IMSS to start with, but it improved as well over time.[13] More likely, workers who are otherwise close to indifferent between working in the formal and the informal sector do not value health benefits very much. Hence, even a very substantial change in the health benefits provided to informal workers is unlikely to affect most workers' decisions to work informally.

One concern with the interpretation of our finding of an increase in informality for less educated workers is that informality was trending upwards already prior to the introduction of SP. If that is the case, the observed increase in informality after the introduction of SP may be due to trends in informality rather than to SP itself. To address this concern, we examine informality around the introduction of Seguro Popular. Specifically, we look at informality up to four years before and two years after[14] the introduction of the program and we restrict the sample to a balanced panel of municipalities. We use our typical set of controls to account for other confounds[15]. Figure 1 plots the results. The coefficients are estimated relative to the year prior to the introduction of Seguro Popular. We can see that there is a significant jump in the propensity to work informally in the first year where Seguro Popular was introduced (year 0). Two and three years prior to the introduction of the program, the propensity to be informal was essentially the same as one year prior to the introduction. Four years prior to the introduction of the program, informality was significantly lower, but not much lower.

[13] Sistema de Proteccion Social en Salud. Annual reports 2005-2010

[14] Since we take as reference year the year before the introduction of SP, going back up to 4 years before the introduction of SP allows us to look at 3 periods prior to the reference year. Symmetrically, going up to 2 years after the introduction of SP allows us to examine 3 periods after the reference year.

[15] The results are not substantially affected if we don't use any controls.

Overall, there is some weak evidence for an increasing trend in informality prior to the introduction of Seguro Popular. To check whether our results are robust to such a trend, we added state-specific time trends to the specifications in columns 3 and 4 of Table 3 and found that the results are not significantly different (results not shown). The impact of the program in the second year (year 1) and third year (year 2) after the introduction is higher than in the first year, which may be due to the further expansion of the program. In any case, the effect of Seguro Popular in the second and third year is not significantly different from the effect in the first year. We conclude from this exercise that the estimated impact of Seguro Popular on the informality of less educated workers is most likely due to the program itself, and not to a pre-existing trend in informality.

While the impact of SP on informality in the first three years seems stable, one may be concerned that as program capacity and enrollment increase, the impact on informality may also increase beyond three years. To address this issue, we look at the impact of the program up to 5 years after its introduction (Figure 4 in the appendix), which restricts the sample to municipalities that introduced SP in 2004 or earlier. This figure confirms that the impact of SP on informality does not increase over time: 5 years out the impact is essentially the same as in the second year when the program was introduced. Given that the estimate of the long-run impact of SP is based by necessity on municipalities that introduced the program early, it is important to check whether the impact of SP was different in early versus late adopters. A further benefit of this check is that it gives some indication as to whether the timing of the introduction of the program may have been correlated with expected impacts on informality. In Figure 4 in the appendix, we plot the impact of SP on informality for workers with 9 years of schooling or less in municipalities that were early adopters (prior to 2004) versus municipalities that were late adopters. We find that the results are very similar among early and late adopters. We conclude that it is unlikely that the roll-out of SP was designed according to expected impacts on informality. Additionally, since early

and late adopters are similarly impacted by SP, the estimate of the long-run impact of SP based on early adopters is likely robust. We can therefore conclude that the impact of SP did not increase over time.

We now turn to the estimation of the impact of the introduction of Oportunidades to urban areas on informality. Since Oportunidades is means-tested, workers may have an incentive to work informally in order to be able to more easily misreport their income and qualify for the program. This serves as an additional robustness test for our results concerning Seguro Popular. Table 4 uses the same specifications as in Table 3 and restricts the sample to municipalities with more than 50,000 inhabitants, since this is the definition of "urban" for the roll-out of Oportunidades. We do not find a significant impact of Oportunidades on informality overall (columns 1 and 2), just as in the case of Seguro Popular. We do not find a significant impact of Oportunidades on informality for any of the subgroups in all specifications with controls. Importantly, the results for Seguro Popular are unaffected by the inclusion of a control for the existence of Oportunidades. Thus, using our preferred definition of informality we find that Seguro Popular increased informality for less educated workers and that Oportunidades did not affect informality.

How robust are these results to alternative measures of informality? Table 5 addresses this question. It repeats the specification in Table 4 for workers with less than 9 years of education but using three other definitions of informality: no written contract, self-employed, and small firm. In columns 1-2, we can see that SP increases informality as defined by "no written contract", even though when adding controls the effect is not statistically significant. Additionally, the size of the effect of SP on informality as defined by no written contract is comparable to the size of the effect when informality is defined as no health insurance or self-employed. This is not surprising since the correlation between the two definitions of informality is 0.8. When informal is defined as being self-employed[16] or working for a small

[16] We have also analyzed the impact of SP on the distribution of occupations and industries and found no significant effect.

firm (less than 5 employees), SP does not affect informality, at least not when adding controls. Additionally, the point estimates are very close to zero. Bosch and Campos-Vazquez (2010) found that formal employment in small firms grew less after the introduction of SP. When looking at the impact of SP on informality within small firms, we do not find any significant effect[17], either for the whole population or for workers with 9 years of schooling or less (results not shown). In fact, our estimate of the impact of SP on informality for all workers in small firms is negative and the upper bound of the 90% confidence interval is 0.1 percentage point, ruling out any economically significant impact of SP on informality in small firms. This suggests that any increase in informality that resulted from SP did not occur through workers becoming self-employed or working for very small firms and was also not particularly concentrated in small firms. As for Oportunidades, consistent with our main results, we find no effect of the program on informality when using these alternative measures and relevant controls.

The impact of Seguro Popular on Job Transitions

As outlined above, if informality became more attractive after the introduction of Seguro Popular, we may expect to see more transitions to informality and fewer to formality. We analyze this issue by looking at the transition probabilities of workers from formality to informality, from non employed to informal, informal to formal, and non employed to formal. A transition is coded as a change in labor market status from the first quarter of interview to the next quarter, conditional on being in the specified initial state. We restrict the data to the first two quarters observed for each individual to minimize potential attrition bias. Additionally, we restrict the data to workers with less than 9 years of schooling[18], since no effect of Seguro Popular was found on the informality status of the general population. The analysis regresses an indicator variable for the transition on the indicator for the presence of the Seguro Popular and a set of controls. In Table 6, we can see that Seguro Popular has

[17] The difference in results for small firms between our paper and Bosch and Campos-Vazquez may be partly due to the fact that we only look at urban areas while Bosch and Campos-Vazquez examine rural areas as well.
[18] We also performed the analysis for workers with less than 9 years of schooling and over 34 years of age and the results were qualitatively the same.

no effect on any of these transition probabilities. In the first case, formal to informal, the sign is positive as the theory would suggest, but the magnitude is almost zero. In the case of the transition from non employment to informality, the sign is positive and significant without controls, but the coefficient becomes insignificant with controls. Note also that the magnitude of the effect is very small. Seguro Popular has a negative but insignificant effect on the transition from informal to formal status and the transition from non-employment to a formal job[19]. The signs are thus consistent with what could be expected from theory but the effect is both very small and statistically insignificant. We thus conclude that Seguro Popular did not significantly affect transitions from and to informality for workers with less than 9 years of schooling.

Seen in the context of the US literature, this result suggests that health insurance does not affect labor mobility, and in particular that job lock is unlikely to have been prevalent in Mexico before the introduction of SP. This result is particularly noteworthy in that Gruber and Madrian (1994) found that health insurance continuation coverage mandates significantly decreased job lock. We have a much bigger change in policy in that SP provides health insurance that is almost as extensive as conventional insurance and yet essentially free of cost. Still, we do not find any impact on job flows. One may argue that we find no effect because the conditions for job lock did not exist in Mexico prior to SP. Indeed, in order for job lock to be an issue, firms must face different costs of providing health insurance. In Mexico, health insurance is provided by employers through their contributions to IMSS (or other similar institutions), and the amount of these contributions is the same for any firm wishing to join the system. Hence it would appear that the cost of providing health insurance does not vary across firms. However, in practice, one could argue that the cost does vary in that informal firms wishing to provide health insurance to a marginal worker face more than the cost of the contribution to IMSS. If an informal firm

[19] We also performed the transition analysis over a full year (5 quarters). We then get a significant negative effect of SP on transitions from informal to formal, and this coefficient remains significant when adding controls. All other results are substantially unaffected when using the transitions over 5 quarters.

pays the contribution to IMSS for a new worker, it must also pay for the other mandated benefits for this worker (especially pension contributions), and it runs a higher risk of paying fines unless it also pays all mandated benefits to all workers that it already employs. Paying health benefits to inframarginal workers would not result in a cost increase if the firm could fully offset the cost by paying lower wages. However, workers who chose to forego health insurance presumably value it below its cost, and therefore the firm would not be able to fully offset the increased cost by decreasing wages. As a result, it seems reasonable to assume that informal firms face a higher cost of providing health insurance to marginal workers than formal firms. Hence job lock is theoretically possible in the absence of SP. If job lock is possible in the absence of SP, then the introduction of SP should drastically reduce it. However, we do not find any evidence for an impact on SP on job flows, and we therefore conclude that job lock was not a substantial problem in the Mexican labor market prior to the introduction of SP.

The impact of Seguro Popular on Wages

The theory of compensating wage differentials predicts that, after the introduction of Seguro Popular, wages in the informal sector should have decreased since SP provides health benefits for informal workers. However, the literature on compensating wage differentials for health insurance in the US finds mixed results. It is therefore quite interesting to see what the Mexican case reveals, especially since we can use a large policy change within a panel setting.

We analyzed the wages of both formal and informal workers who switch sectors from one quarter to the next. This strategy was chosen to correct for time-invariant unobserved individual characteristics that are correlated with both the wage level and working in one sector or the other. It is very important to correct for such characteristics since informal workers are already very different on observables from formal workers and are therefore very likely to differ on unobservables as well. Table 1 describes these differences: Panel A show the entire sample, Panel B show the characteristics for

workers in the formal sector and Panel C for those working in the informal sector. As we can see, workers in the informal sector are older, have more children, and have less years of schooling. Similarly to the transition analysis, we only retain the first two quarters[20] of observation for each worker and we focus on workers with 9 years of schooling or less[21]. The results are described in Table 7. We can see that Seguro Popular has no significant impact on wage changes for workers who move between the formal and the informal sectors. This suggests that workers at the margin of informality do not value health benefits much. These results also show no evidence for compensating wage differentials.

One problem in interpreting the results is that the labor market in Mexico may be segmented. If formal sector jobs pay above market-clearing wages, then the compensating wage differential model need not hold. However, as pointed out above, self-employed workers are unlikely to be excluded from the formal labor market in Mexico. The results in Table 7 are qualitatively similar if we focus on transitions between formal employment and self-employment for workers with 9 years of education or fewer. This suggests that the absence of an effect of SP on the wage gains of workers moving between formal and informal jobs is not driven by labor market segmentation.

If marginal workers do not value health insurance, it makes sense for SP to have no effect on job mobility. If health benefits are not valued, workers will not remain "stuck" in a less productive job just because it provides health benefits. In other words, job lock is unlikely to be a problem. On the contrary, our results suggest that some workers may remain informal because they value health benefits at less than their cost in terms of payroll taxes.

[20] Results are substantially unaffected when analyzing job changes over a full year (5 quarters).
[21] Once again, we performed the analysis for workers with less than 9 years of schooling and over 34 years of age and the results were substantially the same.

Conclusion

This paper has analyzed the impact of the expansion of the social protection system in Mexican urban areas on informality. This includes the System of Social Protection in Health through Seguro Popular and Oportunidades. We find that the overall impact of both components on informality is close to zero and insignificant. This suggests that the expansion of these social protection programs had a negligible distortionary impact on labor supply. Given the well-documented benefits of these programs, the findings of this paper suggest that these programs are welfare-improving. More specifically, we find that Oportunidades does not significantly increase informality for any demographic group we examined. The absence of an effect is most likely explained by the specificities of the roll-out for this program. As for Seguro Popular, we find that it was associated with a significant increase in informality among workers with less than nine years of schooling, and, among this group, the increase in informality was larger for workers who are either married heads of household with kids or above 34 years old. Even among these groups, the size of the impact remains small, as it is always less than 2 percentage points[22]. For all workers with 9 years of education or less, Seguro Popular was associated with a 0.9 percentage point increase in informality. Additionally, we find no effect of Seguro Popular on transitions between formal and informal jobs or on wage gains of job movers. These findings contribute to the literature on the impact of health insurance provision on labor mobility and wages, a literature which presents mixed results for the US context. We find that extending health insurance coverage does not increase labor mobility nor does it impact the wages of marginal workers in Mexico.

[22] Colombia has also extended the coverage of health insurance to poor uninsured households and a recent working paper shows that informality increased as a result of this policy (Camacho et al., 2009). The increase in informality seems somewhat higher in Colombia than in Mexico, and it would be interesting to further examine why this is so.

With respect to informality in developing countries, our results suggest that marginal workers do not choose to work formally or informally on the basis of the availability of health benefits. Since we also do not find any effect of Seguro Popular on the wages of workers who move between the formal and the informal sectors, we speculate that marginal workers may not value the health benefits provided in formal jobs as much as these benefits cost employers in payroll taxes. If so, then mandating the payment of payroll taxes for health coverage of less educated workers could be partly responsible for high informality in this group. This does not imply that less educated workers should not be provided health benefits, but rather that payroll taxes may not be the best way of financing these benefits. Overall, we conclude that Seguro Popular and Oportunidades did not significantly increase distortions in urban labor markets, but that financing health insurance through compulsory payroll taxes may well increase informality as workers are unwilling to pay for a benefit they value at less than its cost.

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Table 1
Summary statistics

A. All Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
No Health Services or self-employed	951,354	0.5044	0.5000	0	1
Salaried and no health services	951,354	0.3327	0.4712	0	1
Self-employed	951,302	0.1717	0.3771	0	1
No contract	696,473	0.3528	0.4778	0	1
Small firm (< employees)	941,317	0.4238	0.4942	0	1
Gender (Male=1)	951,354	0.6039	0.4891	0	1
Age	951,354	35.7225	12.3681	15	69
Married	951,354	0.5219	0.4995	0	1
Years of Schooling	950,690	10.1115	4.8546	0	24
Children in Household	951,354	5.0493	8.1611	0	116
Electricity growth in municipality	837,580	0.7409	23.5294	-0.99	1075.32
Hospitals per capita	939,112	0.0001	0.0001	0	0.0018
Economic Sector (Distribution of workers)*					
Construction	951,354	0.1866	0.3896	0	1
Manufacture	951,354	0.2183	0.4131	0	1
Commerce	951,354	0.4590	0.4983	0	1
Services	951,354	0.0492	0.2162	0	1
Not specified	951,354	0.0014	0.0380	0	1

B. Formal Workers (No health services or self-employed equals zero)

Variable	Obs	Mean	Std. Dev.	Min	Max
Gender (Male=1)	471,525	0.6107	0.4876	0	1
Age	471,525	34.8398	11.0855	15	69
Married	471,525	0.5425	0.4982	0	1
Years of Schooling	471,231	11.3094	4.6690	0	24
Children in Household	471,525	4.8835	7.7397	0.0000	116.0000
Electricity growth in municipality	415,695	0.6879	22.9120	-1	1075.3170
Hospitals per capita	466,545	0.0001	0.0001	0	0.0018387
Economic Sector (Distribution of workers)*					
Construction	471,525	0.2503	0.4332	0	1
Manufacture	471,525	0.1667	0.3727	0	1
Commerce	471,525	0.4593	0.4983	0.0000	1.0000
Services	471,525	0.0753	0.2639	0	1.0000
Not specified	471,525	0.0003075	0.0175334	0	1

C. Informal Workers

Variable	Obs	Mean	Std. Dev.	Min	Max
Gender (Male=1)	479,829	0.5972	0.4905	0	1
Age	479,829	36.5900	13.4541	15	69
Married	479,829	0.5017	0.5000	0	1
Years of Schooling	479,459	8.9342	4.7443	0	24
Children in Household	479,829	5.2123	8.5519	0.0000	110.0000
Electricity growth in municipality	421,885	0.7932	24.1223	-1	1075.3170
Hospitals per capita	472,567	0.0001	0.0001	0	0.0018387
Economic Sector (Distribution of workers)					
Construction	479,829	0.1239	0.3295	0	1
Manufacture	479,829	0.2690	0.4434	0	1
Commerce	479,829	0.4586	0.4983	0.0000	1.0000
Services	479,829	0.0235	0.1514	0	1.0000
Not specified	479,829	0.0025676	0.0506063	0	1

Sources:

- Seguro Popular. Comision Nacional de Proteccion Social en Salud. Annual information by village collapsed by non-rural units in the by municipality
- Oportunidades. Coordinacion Nacional de Oportunidades. Annual information by village collapsed by non-rural units in the municipality
- Employment and sociodemographic variables. Authors' estimations using ENE (1995-2004) and ENOE (2005-2009)

* It refers to the economic sector of the job where the employee is working at

Table 2

Endogeneity Analysis. Informality as Predictor of Year of Introduction of Seguro Popular. Analysis by Municipality

VARIABLES	(1) Year SP introduced /A	(2) Year SP introduced /A	(3) Year SP introduced /A	(4) Year SP introduced /A	(5) SP in 2004 or later /B	(6) SP in 2004 or later/B	(7) SP in 2004 or later/B	(8) SP in 2004 or later/B
Informality/1	1.223*	1.232*	0.974	0.154	0.269	0.348	0.086	0.108
	[0.674]	[0.686]	[0.915]	[0.785]	[0.220]	[0.225]	[0.292]	[0.231]
Log Total Pop Municipality			-0.230*	-0.204*			-0.098**	-0.034
			[0.127]	[0.112]			[0.040]	[0.033]
Doctors Per Capita			-163.359	-210.418*			-52.342	-91.077**
			[139.385]	[123.471]			[44.453]	[36.321]
Hospitals Per Capita			-5,284.214	35,155.537			2,477.716	7,974.162
			[33,150.889]	[28,649.062]			[10,572.511]	[8,427.628]
Percent No Electricity			-3.503	-0.537			-0.764	0.529
			[3.252]	[2.766]			[1.037]	[0.814]
Log GDP per capita			0.189	0.332			0.080	0.083
			[0.322]	[0.298]			[0.103]	[0.088]
Gender			-4.376	-4.790**			-0.930	-0.827
			[2.857]	[2.288]			[0.911]	[0.673]
Age			0.056	-0.015			0.025	-0.000
			[0.062]	[0.048]			[0.020]	[0.014]
Years of Schooling			0.081	0.174*			-0.007	0.047*
			[0.113]	[0.088]			[0.036]	[0.026]
Log Population State		0.392***				0.081*		
		[0.131]				[0.043]		
Governor PAN		-0.039				0.005		
		[0.246]				[0.081]		
Governor PRD		-0.360				-0.247**		
		[0.343]				[0.112]		
Constant	1.075***	-4.740**	2.335	3.166	0.43452***	-0.801	0.727	0.441
	[0.385]	[1.962]	[3.922]	[3.509]	[0.126]	[0.642]	[1.251]	[1.032]
State FE	NO	NO	NO	YES	NO	NO	NO	YES
Observations	211	211	195	195	211	211	195	195
R-squared	0.016	0.068	0.066	0.589	0.007	0.054	0.064	0.650

Standard errors in brackets and clustered . *** p<0.01, ** p<0.05, * p<0.1.
Notes: A/ Dependent variable indicates the year of introduction of SP.
B/ Dependent variable is a dummy variable equal to zero if the municipality was covered before 2004, and equal to one if it was covered after this year.
Coefficients show the effect of the variable in explaining if the municipality is covered by Popular during the first three years of its functioning. OLS regressions.
NHSE: No health services or self-employed.
Sources: [1] INEGI, Employment surveys 1995-2009/
[2/] CONAPO, Mexican Population Council, Population estimates
[3/] INEGI, Annual State Yearbooks 1995-2009
[4/] CONAPO, Mexican Population Council, Marginalization Indexes [5/] Center of Research for Development. Annual election is in Mexico

Table 3

The impact of Seguro Popular on informality

COEFFICIENT	Sample 1 All		Sample 2 Schooling <= 9 yrs		Sample 3 Males		Sample 4 Married, Schooling <= 9 yrs, with children		Sample 5 Schooling<=9, Age>34	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Informal	Informal	Informal	Informal	Informal	Informal	Informal	Informal	Informal	Informal
Ind. SP	-0.004	0.008	0.03756***	0.00858*	-0.00953**	0.009	0.007*	0.012*	0.021***	0.014***
	[0.00363]	[0.006]	[0.00323]	[0.005]	[0.004]	[0.006]	[0.004]	[0.006]	[0.003]	[0.005]
Schooling		-0.021***		-0.029***		-0.013***		-0.020***		-0.016***
		[0.001]		[0.001]		[0.00054]		[0.001]		[0.001]
Age		-0.019***		-0.017***		-0.017***		-0.003***		-0.015***
		[0.001]		[0.001]		[0.001]		[0.001]		[0.002]
Age^2		0.001***		0.001***		0.001***		0.001***		0.001***
		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Male		-0.020***		-0.080***		0.000		0.000		-0.136***
		[0.005]		[0.007]		[0.000]		[0.000]		[0.007]
Married		-0.019***		-0.011***		-0.085***		0.000		0.001
		[0.002]		[0.002]		[0.003]		[0.000]		[0.002]
Children		0.003***		0.003***		0.002***		0.002***		0.001***
		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Electricity Growth		-0.0001***		-0.0001***		-0.0001***		-0.0001***		-0.0001**
		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Constant	0.519***	0.832***	0.582***	0.853***	0.515***	0.74***	0.531***	0.880***	0.698***	1.367***
	[0.0019]	[0.028]	[0.002]	[0.031]	[0.002]	[0.028]	[0.002]	[0.047]	[0.001]	[0.047]
Economic Sector FE	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Year FE	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Observations	1043323	898682	608788	518014	630167	540996	179873	152016	214505	183234
Number of municipalities	350	318	350	318	350	318	350	317	350	318
R-squared	0.000	0.123	0.001	0.125	0.000	0.116	0.000	0.124	0.000	0.113

* significant at 10%; ** significant at 5%; *** significant at 1%

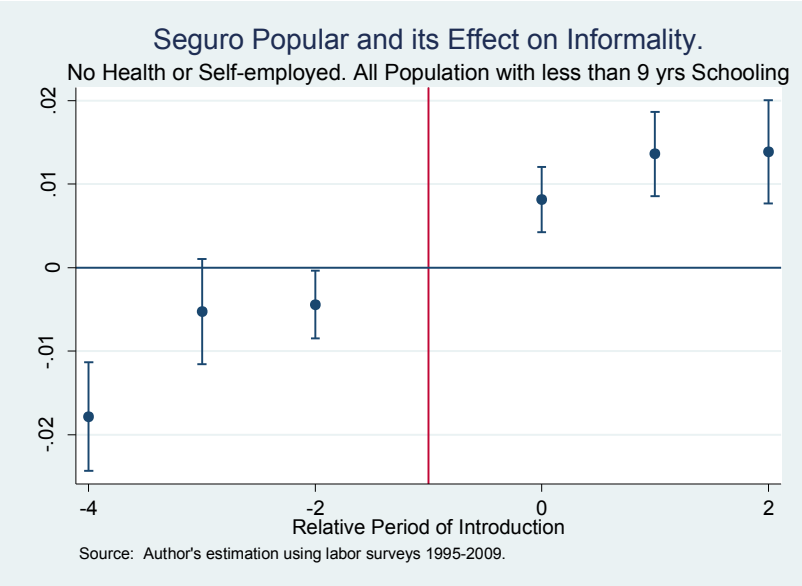
Standard errors clustered by municipality

Notes: Linear probability model. Informal is self-employed or no health benefits through the employer.

Informality is measured as no health services or self-employed

Figure 1

Informality and the timing of the introduction of Seguro Popular



Notes: Coefficients on relative year estimated from a linear probability model, with controls for sector, age, age squared, gender, years of schooling, log population, electricity growth, year and municipality fixed effects. The sample is restricted to workers with 9 years of schooling or less. Informal is self-employed or no health benefits through the employer. Data from years prior to 4 years before the introduction of Seguro Popular and more than 2 years after the introduction of the program is not used. Balanced panel of municipalities. Confidence Interval is at 95%.

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Table 4

The impact of the introduction of Seguro Popular and Oportunidades on informality

COEFFICIENT	Sample 1 All		Sample 2 Schooling <=9 yrs		Sample 3 Males		Sample 4 Married, Schooling <=9 yrs, with children		Sample 5 Schooling<=9, Age>34	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Informal	Informal	Informal	Informal	Informal	Informal	Informal	Informal	Informal	Informal
Indicator SP	-0.003	0.008	0.033***	0.010**	-0.009**	0.009	0.007	0.013**	0.021***	0.019***
	[0.004]	[0.006]	[0.004]	[0.005]	[0.004]	[0.006]	[0.005]	[0.006]	[0.004]	[0.005]
Indicator Oportunidades	-0.001	0.006	0.007**	-0.008	0.001	0.011	0.001	0.010	0.003	-0.002
	[0.004]	[0.010]	[0.003]	[0.010]	[0.004]	[0.011]	[0.005]	[0.012]	[0.004]	[0.001]
Gender		-0.015***		-0.080***		0.00000		0.000		-0.133***
		[0.006]		[0.008]		[0.00000]		[0.000]		[0.008]
Age		-0.019***		-0.017***		-0.022***		-0.003**		-0.017***
		[0.001]		[0.001]		[0.001]		[0.001		[0.002]
Age^2		0.001***		0.000***		0.000***		0.000***		0.000***
		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Schooling		-0.021***		-0.030***		-0.014***		-0.020***		-0.017***
		[0.001]		[0.001]		[0.001]		[0.000]		[0.001]
Children		-0.001***		0.000		-0.000		0.000***		-0.000
		[0.000]		[0.000]		[0.000]		[0.000]		[0.000]
Ln population		0.010		-0.062		-0.004		-0.076		-0.094**
		[0.063]		[0.044]		[0.065]		[0.052]		[0.041]
Electricity Growth		-0.0001***		-0.0001***		-0.0001***		-0.0001***		-0.0000
		[0.000]		[0.00001]		[0.000]		[0.000]		[0.000]
Hospitals per capita		-152.523		-121.545**		-163.725*		-130.077*		-93.690*
		[93.417]		[53.23561]		[91.939]		[76.860]		[48.649]
Constant	0.506***	0.684	0.565***	1.692***	0.503***	0.811	0.518***	1.816***	0.684***	2.019***
	[0.003]	[0.818]	[0.002]	[0.579]	[0.003]	[0.841]	[0.003]	[0.680]	[0.002]	[0.555]
Sector FE	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Year FE	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Observations	951354	826862	545851	470203	574529	497890	161312	138222	191168	165507
Number of municipalities	160	148	160	148	160	148	160	147	160	148
R-squared	0.000	0.121	0.001	0.125	0.000	0.110	0.000	0.123	0.001	0.113

* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors clustered by municipality
Notes: Linear probability model. Informal is self-employed or no health benefits through the employer
Source: Authors' estimations using ENE (1995-2004) and ENOE (2005-2009)

Table 5

The impact of the introduction of Seguro Popular and Oportunidades on alternative measures of informality

COEFFICIENT	No Contract (Schooling <=9 years)		Self-Employed (Schooling <=9 years)		Small Firm (< 5 employees, Schooling <=9 years)	
	(1)	(2)	(3)	(4)	(5)	(6)
Indicator SP	0.070***	0.016	0.003	0.001	0.041***	-0.000
	[0.007]	[0.010]	[0.002]	[0.003]	[0.004]	[0.004]
Ind. Oportunidades	-0.002	0.009	0.008***	0.001	0.014***	-0.006
	[0.005]	[0.028]	[0.002]	[0.003]	[0.003]	[0.005]
Schooling		-0.040***		-0.011***		-0.028***
		[0.001]		[0.000]		[0.001]
Age		-0.026***		0.011***		-0.008***
		[0.001]		[0.000]		[0.000]
Age^2		0.000***		-0.000***		0.000***
		[0.000]		[0.000]		[0.000]
Male		-0.049***		-0.024***		-0.099***
		[0.007]		[0.005]		[0.006]
Married		-0.063***		0.017***		-0.000
		[0.003]		[0.002]		[0.002]
Children		0.003***		0.001***		0.007***
		[0.000]		[0.000]		[0.000]
Electricity Growth		-0.000		-0.000***		-0.000***
		[0.000]		[0.00001]		[0.000]
Constant	0.441***	1.170***	0.208***	-0.209***	0.500***	0.461***
	[0.004]	[0.030]	[0.001]	[0.01110]	[0.002]	[0.019]
Sector FE	NO	YES	NO	YES	NO	YES
Yea FE	NO	YES	NO	YES	NO	YES
Observations	424227	361940	609990	519115	604540	514329
Number of municipalities	350	318	350	318	350	318
R-squared	0.004	0.156	0.000	0.115	0.002	0.149

* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors clustered by municipality

Notes: Linear probability model. Informal is self-employed or no health benefits through the employer

Source: Authors' estimations using ENE (1995-2004) and ENOE (2005-2009)

Table 6

Transition Probabilities Between Formality, Informality and Non-employment

COEFFICIENT	(1) Transition Formal to Informal	(2) Transition Formal to Informal	(3) Transition Non-Employed to Informal	(4) Transition Non-Employed to Informal	(5) Transition Informal to Formal	(6) Transition Informal to Formal	(7) Transition Non-Employed to Formal	(8) Transition Non-Employed to Formal
Ind. SP	0.003	0.002	0.006*	0.002	-0.001	-0.003	-0.000	-0.009
	[0.004]	[0.004]	[0.003]	[0.002]	[0.002]	[0.003]	[0.002]	[0.002]
Schooling		-0.010***		-0.018***		0.004***		0.018***
		[0.001]		[0.001]		[0.000]		[0.001]
Age		-0.008***		-0.004***		-0.001***		0.004***
		[0.001]		[0.000]		[0.000]		[0.000]
Age^2		0.000***		0.000***		0.000		-0.000***
		[0.000]		[0.000]		[0.000]		[0.000]
Male		0.013***		-0.034***		0.019***		0.034***
		[0.003]		[0.002]		[0.002]		[0.003]
Married		-0.026***		-0.004***		-0.010***		0.00374***
		[0.002]		[0.001]		[0.002]		[0.001]
Children		0.000***		0.000***		-0.000		-0.000***
		[0.000]		[0.000]		[0.000]		[0.000]
Electricity Growth		0.001*		-0.000**		-0.000**		0.000**
		[0.000]		[0.000]		[0.000]		[0.000]
Constant	0.112***	0.165***	0.170***	0.050***	0.086***	0.047***	0.110***	-0.048***
	[0.003]	[0.016]	[0.00196]	[0.004]	[0.00184]	[0.006]	[0.002]	[0.004]
Economic Sector FE	NO	YES	NO	YES	NO	YES	NO	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	158744	142488	568140	508924	240526	215899	568140	508924
Number of municipalities	332	302	332	304	332	303	332	304
R-squared	0.000	0.094	0.014	0.663	0.001	0.050	0.022	0.346

Standard errors clustered by municipality in brackets

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

Notes: Linear probability model. Informal is self-employed or no health benefits through the employer

Table 7

Wage Differentials from Switching Jobs between Formal and Informal Sectors

COEFFICIENT	(1) Wage Change Formal to Informal	(2) Wage Change Formal to Informal	(3) Wage Change Informal to Formal	(4) Wage Change Informal to Formal
Indicator SP	-0.012	-0.016	-0.012	-0.010
	[0.014]	[0.016]	[0.019]	[0.020]
Schooling		-0.002		-0.006**
		[0.002]		[0.002]
Age		0.004*		-0.006***
		[0.002]		[0.002]
Age^2		-0.000*		0.000**
		[0.000]		[0.000]
Male		0.021		-0.034***
		[0.016]		[0.010]
Married		0.011		-0.060***
		[0.010]		[0.011]
Children		-0.000		0.000
		[0.001]		[0.000]
Electricity Growth		-0.001		-0.005**
		[0.001]		[0.002]
Constant	-0.006	-0.071*	0.021*	0.268***
	[0.012]	[0.042]	[0.012]	[0.047]
Economic Sector FE	NO	YES	NO	YES
Year FE	YES	YES	YES	YES
Observations	14668	13279	15085	13700
Number of municipalities	300	266	307	274
R-squared	0.001	0.004	0.000	0.008

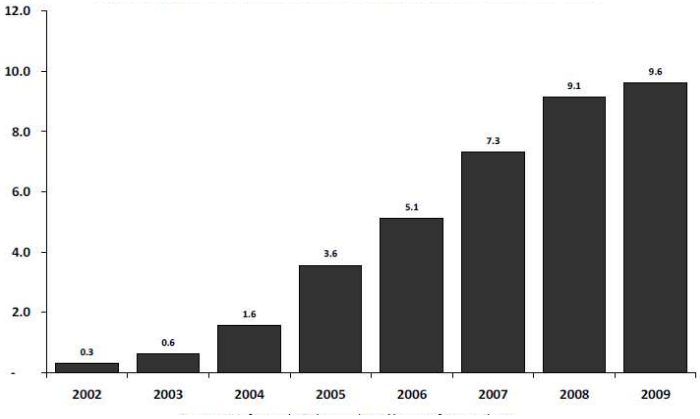
Standard errors clustered by municipality in brackets

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

Notes: Linear probability model. Informal is self-employed or no health benefits through the employer

Figure 2

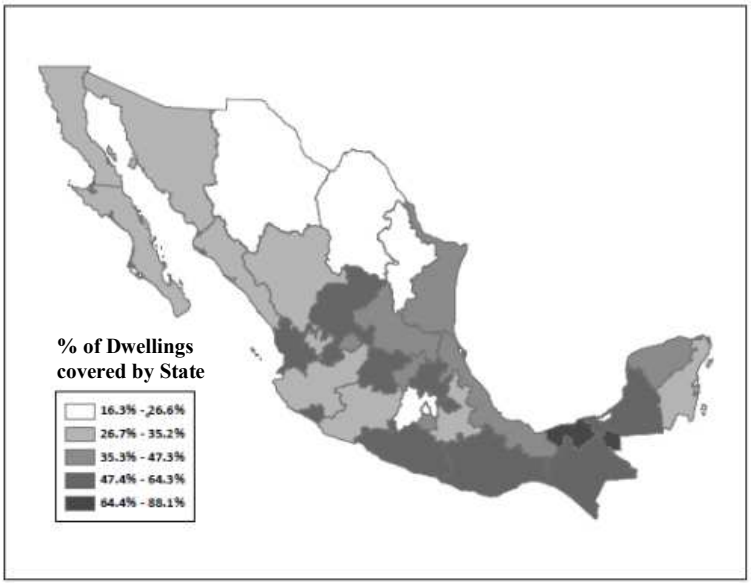
Total Dwellings Covered *Seguro Popular* by Year (Millions)



Source: CNPSS (2009)

Figure 3

Geographical Coverage of Seguro Popular in 2009, in percentage of population

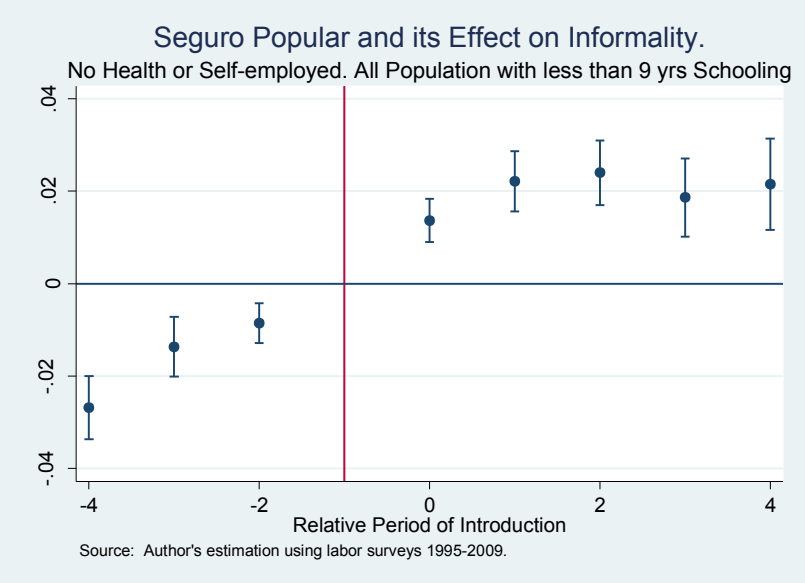


Source: CNPSS (2009)

APPENDIX 1: further results

Figure 4

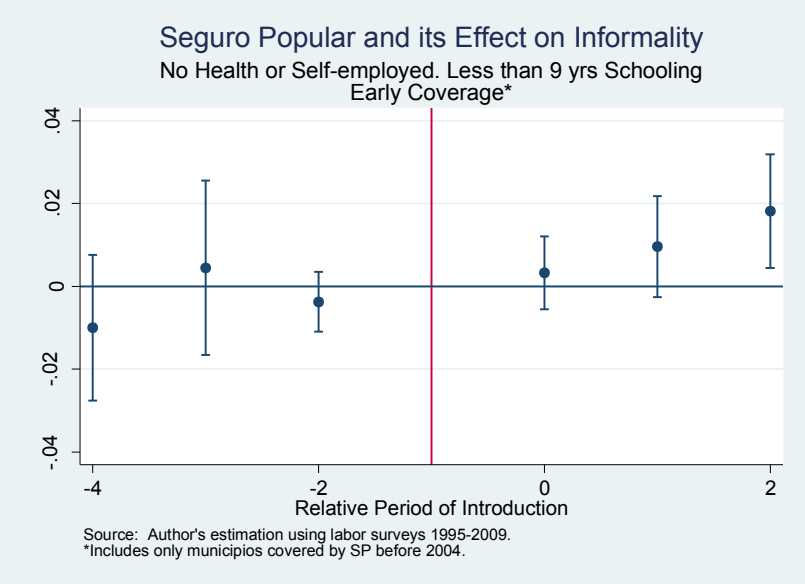
The timing of the impact of Seguro Popular on informality, up to 5 years after introduction

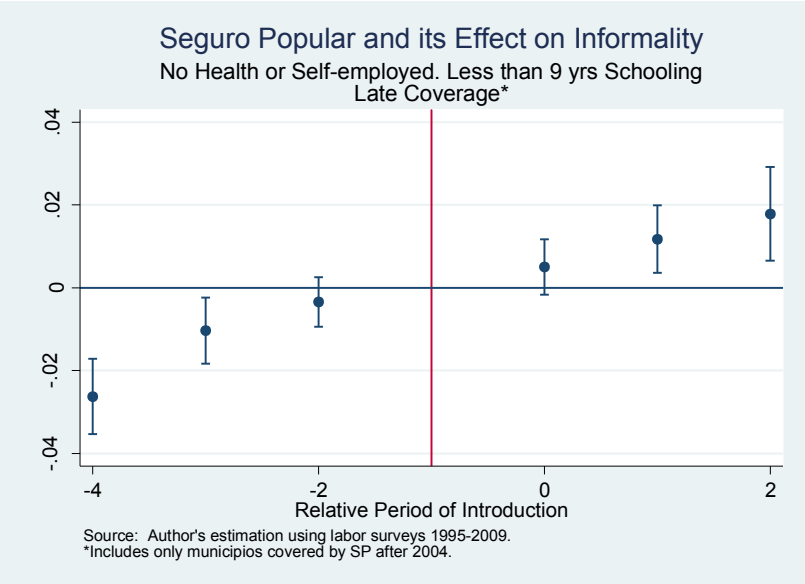


Notes: Coefficients on relative year estimated from a linear probability model, with controls for sector, age, age squared, gender, years of schooling, log population, electricity growth, year and municipality fixed effects. The sample is restricted to workers with 9 years of schooling or less. Informal is self-employed or no health benefits through the employer. Data from years prior to 4 years before the introduction of Seguro Popular and more than 4 years after the introduction of the program is not used. Balanced panel of municipalities. Confidence Interval is at 95%.

Figure 5

The timing of the impact of Seguro Popular on informality, broken down by early and late coverage





Notes: Coefficients on relative year estimated from a linear probability model, with controls for sector, age, age squared, gender, years of schooling, log population, electricity growth, year and municipality fixed effects. The sample is restricted to workers with 9 years of schooling or less. Informal is self-employed or no health benefits through the employer. Data from years prior to 4 years before the introduction of Seguro Popular and more than 2 years after the introduction of the program is not used. Balanced panel of municipalities. Confidence Interval is at 95%.

APPENDIX 2: Contributions to Social Security

Insurance	Contribution*	Employer (% of total)	Employee (% of total)	Government (% of total)
Retirement	6.5	70	25	5
Life and disability	4	70	25	5
Health and Maternity	12.5	100		
Workers compensation	2.5	100		
Child Care	1	100		
Housing	5	100		
Total	**31.5**	**90**	**8.3**	**1.7**

Source: Law of Social Security. Estimates using the average wage.

APPENDIX 3: Institutional background on Seguro Popular and Oportunidades

Seguro Popular represents the largest effort in Mexico to extend coverage of health services since the creation of the *Secretaría de Salud* (SS) and *Instituto Mexicano del Seguro Social* (IMSS, the provider of social security for formal workers in the private sector and their families) in 1943.

Seguro Popular has in principle a progressive premium. Individuals in the first two deciles of income (before 2010) and four deciles of income (before 2010) are exempt from payment, and the premium increases with income level for the other deciles.

According to the current rules, the federal government funds 83% of total annual cost of the insurance of every affiliate while state governments pay the remaining 17% and bears a portion of the cost of the infrastructure of health services. The total number of beneficiaries in the program and the corresponding funds to the states is defined by the federal and state governments. Once the target of affiliation is set, states, the health local authorities define the affiliation process. This set of rules for affiliation must comply with a statistical procedure similar to the one used in *Oportunidades:* every covered dwelling must be identified and classified into income deciles in order to determine the contributory category to which they belong. This is done using a discriminant analysis model provided by the *Comisión Nacional de Protección Social en Salud* (CNPSS). There are some exceptions to this protocol, and federal and state governments can determine the affiliation of dwellings without the classification.[23] Seguro Popular has been introduced in all 31 states and Distrito Federal. Total expenditure and coverage differ widely among states (Figure 3 and Figure 6), and the observed differences are not consistent with the compensatory objective of converging towards equal spending

[23] The rules allow for collective affiliations of specific groups. These may be negotiated by unions, production organizations or any other NGO or government agencies. See Scott (2006)

per capita across states. Up to 2011, the SP package includes 275 medical interventions, which go from routine check-ups to third level surgeries.

Oportunidades was designed with the objective of breaking the intergenerational transmission of poverty by investing in the human capital of new generations. It provides cash transfers and other services needed to satisfy the minimum for food, health and education. The cash transfer is conditioned on regular school attendance for children, and health clinic visits. The program was designed under the assumption that poverty is the result of low acquisition of capabilities that translates into bad functioning during adulthood, a phenomenon that has been replicated during the past generations.

The program has three main components:

1. Health and nutrition services

2. Food subsidy in cash equivalent to 35 kilograms of tortillas per month

3. Educational grants for students under 22 and older than 10

The first two refer to a basic plan of preventive health care, pregnancy care, nutritional supplements, and bimonthly cash subsidy to avoid malnutrition in children. The educational grants are granted to each member of the household under twenty one years old. They must be registered full-time in school between the third grade of primary school and the third year of intermediate school. Beneficiaries are required to take preventive care and attend at least 85% of classes in order to receive the cash transfer, which is given directly to the mother in the household.

The amount of money varies depending on the years of schooling and the gender composition of children. The grant is higher for females in middle and high school. The purpose of this difference is to reduce the gap in school attendance by gender given that females tend to leave their studies in greater numbers and at earlier ages than males. The full description of this benefit is included in Table 8.

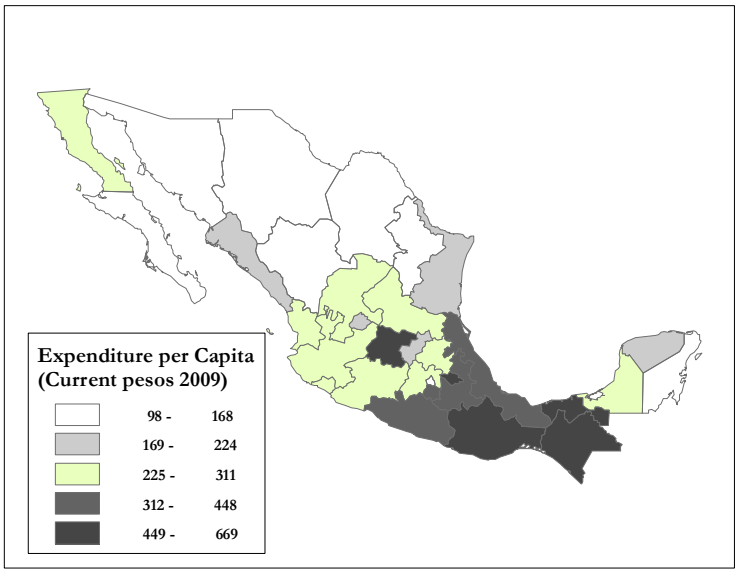
The program is targeted using both geographical targeting and proxy means tests. Families are chosen according to methodology designed by the federal government. The resources are the responsibility of the federal government, but the program also involves the local governments in the provision of health and educational facilities. The historical affiliation and the geographic distribution of the affiliates are described in Figure 7 and Figure 8.

The program first covered the rural poor villages of the country. All households in poor villages were eligible for the program (See Behrman (1999)). This made it very easy for state and federal authorities to expand the program and facilitated the registration process. The large number of these type of villages allowed authorities to design a randomized social experiment to do an impact evaluation. A total of 506 localities in the evaluation sample were randomly divided into two groups: a treatment group of 320 localities were covered in 1998, and 186 localities were covered in 2000.[24] Schultz (2000, 2004), Behrman, Sengupta and Todd (2005), Parker and Skoufias (2000) and Skoufias (2001) show that the program significantly improved health and schooling outcomes and reduced child labor.

[24] Originally these villages were scheduled to be covered in 2002 at the end of the rural expansion. However, the media coverage of the experiment forced its inclusion.

Figure 6

Variation of Expenditure of Seguro Popular by State, 2009



Source: CNPSS (2009)

Table 8

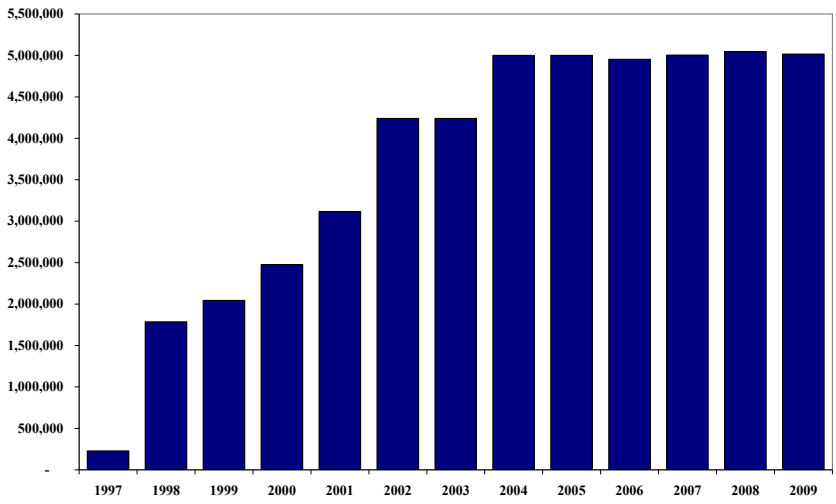
Current benefits of Oportunidades by School Level

School Level	Grant Boys	Grant Girls		Max. Food + School Per Household
Elementary	3	$12.00		
	4	$14.00		
	5	$18.00		
	6	$24.00		$110
Secondary	7	$35.00	$37.00	
	8	$37.00	$41.00	
	9	$39.00	$45.00	
High School	1	$58.50	$67.50	$185
	2	$63.00	$71.50	
	3	$66.50	$76.00	

Source: Coordinacion Nacional de Oportunidades

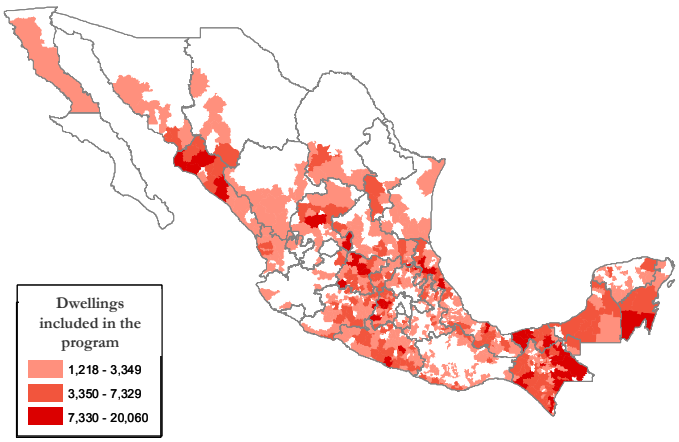
Exchange rate: 11 pesos per USD.

Figure 7
Total dwellings covered by Progresa-Oportunidades by year



Source: Coordinacion Nacioanal de Oportunidades

Figure 8
Geographical Coverage of Oportunidades in 2009



Source: Coordinacion Nacioanal de Oportunidades