From Caring to Work: The Labor Market Effects of Noncontributory Health Insurance.

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Abstract

Health reforms in low and middle-income countries usually include the provision of free or subsidized health insurance. In this paper, I examine whether this type of insurance encourages employment by freeing up resources previously used by households to cope with health shocks. To isolate the causal effect of providing free health insurance I use a difference-in-differences design that exploits municipal (county) level variation in the rollout of Mexicoôs Seguro Popular (SP). My main finding is that SP increases labor supply by retaining workers in the labor force. I propose that this occurs because SP reduces the time burden that dependents in poor health impose on caregivers. Consistent with this channel, I find that the labor supply response triggered by SP is driven by women, in particular those with caregiving responsibilities. Time use estimates provide additional evidence of the mechanism, as they illustrate that the increase in female labor supply is due to the reallocation of time from caregiving tasks at home to work in the labor market. The finding that SP increases labor supply is especially important, because it shows that the provision of subsidized health insurance need not entail an efficiency loss in the labor market. Specifically, I show that the increase in the share of workers in jobs without employer-based health insurance, that is, in informal jobs, is not driven by workers moving to less productive informal jobs, but by informal workers staying in the labor force. Accordingly, back-of-the-envelope calculations suggest that SP has led to a gain of one quarter of one percent of GDP.

Keywords: Health insurance; Crowd-out; Informality; Female labor supply.
JEL codes : I13, I15, I38, J21, J22, O12, O17.

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1 Introduction

Illness is one of the greatest and least predictable shocks to the economic opportunities of the poor. Risk pooling strategies in the form of social safety nets, access to formal insurance markets, and even informal networks to insure against illness are often lacking or completely unavailable to the poor.[1] Accordingly, it has been shown that even when households are able to smooth consumption following a health shock, they do so by employing costly risk-coping strategies. These strategies include depleting savings, accumulating expensive debt, selling durable assets, reducing investments in human capital, and reallocating labor away from productive activities.[2] These responses to risk mean that health shocks among the poor not only reduce their welfare when they occur, but are persistent in the long run.

Given the scope for welfare-improving government intervention,[3] a number of countries have introduced large-scale health reforms over the last three decades that usually entail the provision of free or heavily subsidized health insurance.[4] Despite a body of empirical work suggesting that these types of programs are capable of improving health outcomes, especially among the poor,[5] it is still unclear whether they are welfare improving overall. In particular, concerns over behavioral responses in the labor market, and subsequent efficiency losses, have figured prominently in the policy discussions that surround the introduction of publicly subsidized health insurance, Levy and Schady (2013).

In this paper, I expand on the discussion of the labor market effects of these programs by showing that they are also capable of creating an efficiency-enhancing response in the labor market. Specifically, I show that publicly subsidized health insurance increases labor supply, and that this occurs because insurance reduces exposure to health shocks, thereby enabling households to reallocate resources from costly coping strategies to productive activities.

I provide some of the first evidence of these relationships by recovering causal estimates of the effect that publicly subsidized health insurance has on labor supply, and specifically on the decision to exit or enter employment. I deal with the potential endogeneity of access to health insurance by exploiting the variation created by the municipal-[6] level rollout of Mexicoôs Seguro Popular (SP). This nationwide program provides free health insurance and better access to health services to those not covered by employer-based schemes. Seguro Popular represents the

[1] Fafchamps and Lund (2003); De Weerdt and Dercon (2006).

[2] See, for example,Gertler and Gruber (2002); Gertler et al. (2009); Mohanan (2013); Islam and Maitra (2012); Wagstaff (2007); Wagstaff and Lindelow (2014); Kochar (1999); Sparrow et al. (2014).

[3] Chetty and Looney (2006); Rosenzweig and Wolpin (1993); Morduch (1999).

[4] For example, Afghanistan, Brazil, Chile, China, Colombia, Dominican Republic, Ghana, India, Indonesia, Israel, Mexico, Peru, Rwanda, Taiwan, Tanzania, Thailand, Turkey, and Vietnam.

[5] See, for example,: Newhouse (1993); Dow et al. (1997); Gruber et al. (2012); Finkelstein et al. (2012).

[6] A municipality is a second-level administrative unit. It is the equivalent of a county in the US. Mexico has 2,455 municipalities.

largest expansion of non-contributory health insurance coverage in the Americas with over 52.6 million enrollees, Knaul et al. (2012).

I use a difference-in-differences design that compares changes in the labor market outcomes of individuals residing in municipalities already reached by the program with individuals in municipalities not yet reached. In order to isolate plausibly exogenous variation in SP rollout, I focus on two years in the middle of the rollout period for which identifying assumptions are likely to hold. In particular, I show that the municipalities reached by the program in 2004 and 2005 had similar pre-program trends, that SP was not anticipated, and that these municipalities were similar at baseline in terms of observables.

I make use of a number of datasets to address the threat posed by unobserved time-varying factors correlated to the introduction of the program and to labor market outcomes. In particular, I control for changes in economic activity at municipal level using the lights-by-night satellite imagery, and draw on recently released municipal administrative records to account for local government expenditure that could potentially confound estimates of SPôs impact.

My main finding is that SP increases labor supply by reducing the exit flow from employment, that is, by helping workers to stay employed. This labor supply effect is efficiency enhancing and of a significant economic magnitude. A simple counterfactual simulation suggests that the program led to a gain of as much as one quarter of one percentage point of GDP. I structure my results as follows to show that this finding is consistent with past papers, which conversely posited that SP has led to a loss in efficiency.[7]

First, I consider the argument that SP encourages workers to seek jobs without employer-based health insurance, that is, in the context of Mexico informal jobs.[8] This reallocation of labor is expected to reduce efficiency because informal jobs are often described as less productive.[9] Next, I explore the effect of SP on the share of workers in formal jobs, an aggregated labor market metric that depends on both the decision to seek employment and the choice between formal and informal jobs.

Then, having produced results consistent with the findings of past papers, I use labor market transitions to decompose the effect of SP. I find that whereas SP actually increases the relative size of the informal sector, this effect is not driven by workers moving to less productive informal jobs, but by informal workers being retained in the labor force. This finding is consistent with the idea that healthier and better-off workers on the margin between formal and informal employment are unresponsive to the program, while those most marginalized and excluded from formal employment benefit disproportionately from SP.

[7] See Bosch et al. (2012) for a review of the literature.
[8] The relevant dimension of informality for this article is access to employer-based health insurance.
[9] See, for example, Busso et al. (2012).

I pin down a key version of the proposed mechanism, by taking advantage of the fact that SP is well equipped to improve the health of children and the elderly and that, as revealed by survey data before the introduction of SP, uninsured households spent a large fraction of their time caring for sick dependents. Accordingly, I hypothesize that by reducing the time burden that dependents in poor health impose on caregivers, SP increases their ability to join or remain in the labor market.

I further draw on the fact that this response depends on the division of labor within families in order to narrow down the demographic groups that should be disproportionately affected by SP under the proposed mechanism. My analysis focuses on women, not only because this group bears the brunt of caregiving work in Mexico, but also because, as revealed by survey data, women can be frequently be observed diverting their time away from the labor market in order to respond to family needs.

Given that women with caregiving responsibilities who have not fully specialized in this task are the most likely to respond to SP, I also use their marital status, and household composition, to further identify key groups whose labor supply should be disproportionately affected by the program. Consistent with the proposed mechanism, which I formalize in a simple model, my estimates of heterogeneous effects show that the increased retention of informal workers in the labor force is driven by women and primarily by those with caregiving responsibilities. My time-use estimates further indicate that this occurs because SP enables women to substitute caregiving time at home for time in the labor market.

I also test four alternative mechanisms that could create this pattern in the time-use data. First, I rule out that SP operates by reallocating time among household members by showing that households both reduce the total hours spent caregiving and increase the total hours spent in the labor market. Second, I show that SP has not led to delayed childbearing. Third, I illustrate that SP is unlikely to drive an improvement in the health of the working-age population by reviewing the health literature, and showing that SP does not disproportionately benefit workers in more physically demanding occupations. Fourth, I consider the possibility that SP frees up savings to enable capital-constrained entrepreneurs to start their own business. Specifically, I use transitions within the informal sector to show that, while SP enables women to take on new, profitable activities, this effect is too small to account for the overall impact of the program on the labor market.

This paper contributes to three strands of literature. First, it contributes to the literature that analyzes the economic consequences of health shocks[10] by showing that the provision of health insurance enables households to reallocate time from inefficient risk management strategies towards productive activities.

[10] See the papers listed in footnote 2.

Second, the finding that SP increases female labor supply is important both because it provides a channel for the operation of the program, and also because it highlights a previously undocumented consequence of publicly subsidized health insurance. It thereby connects the literature on the labor market effects of health insurance with a wider body of literature that assesses the role played by economic development in the reduction of gender inequalities.[11]

Third, it contributes to the literature on the labor market effects of social insurance in developing economies by showing that relative increases in the size of the informal sector do not necessarily imply a loss of efficiency.[12] My findings suggest that social insurance in Mexico works primarily by affecting the labor force participation margin, and in particular by reducing the exit flow from employment among those most marginalized. These findings thereby imply that the behavioral response triggered by the incentive structure of SP on the labor market is on net efficiency enhancing.

The rest of this paper is organized as follows. Section 2 presents a brief background to SP and the Mexican health care system. Section 3 discusses the possible impact of SP on the labor market, and develops a model that guides the empirical findings. Section 4 discusses the data and the identification strategy. Section 5 presents the main results. Section 6 investigates the channels through which SP affects employment. Section 7 provides supporting evidence consistent with the identification assumptions. Section 8 concludes.

2 Background social protection in Mexico

Prior to the introduction of SP, access to health services in Mexico depended primarily on labor market status.[13] The majority of those employed in private sector jobs with employer-based health insurance accessed health services through IMSS while public sector employees accessed services to ISSSTE.[14] These institutions differ from employer based health insurance schemes in other countries in several respects. First, both IMSS and ISSSTE are public federal institutions financed through a payroll tax.[15] Second, these institutions are vertically integrated, serving the dual role of social security funds and health providers. Third, affiliates are restricted to using providers operated by the their fund and have no guaranteed package of services. Fourth, health insurance cannot be independently purchased of other social benefits such as pensions or

[11] See Duflo (2011) for a review of this literature.

[12] See, for example, in Mexico: Aterido et al. (2011a); Azuara and Marinescu (2013); Bosch and Campos-Vazquez (2010). In Colombia: Camacho et al. (2013). In Thailand: Wagstaff and Manachotphong (2012).

[13] Private insurance has always been available but it is used by less than 1% of the population, OECD (2005).

[14] By its acronym in Spanish: Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado. Members of the military and of the state run petroleum company have their own funds.

[15] Contributions to social security are roughly equivalent to 31.5 % of the average wage, with approximately a third of that amount going to health care, Azuara and Marinescu (2013).

disability insurance.[16] Fifth, health insurance coverage is automatically extended to the nuclear household of the affiliate.[17]

Those not employed or in jobs without employer-based health insurance (i.e., informally employed), accessed some health services through a network of providers operated by the ministry of health (MoH). These services, however, were limited both because user fees at the point of service restricted access, and because the system was severely underfunded. In 2000 IMSS expenditures per capita were twice as large as those of the MoH network, Lakin (2010).

Unsurprisingly, these asymmetries in access and quality of health services resulted in large health inequalities between the insured and the uninsured. With the objective of bridging this gap the Mexican government undertook a comprehensive health reform. Following a pilot phase, that took place between october of 2002 and december of 2003, Seguro Popular (SP) was introduced on January 2004 as the centerpiece of the new general health law. All Mexican residents not covered by employer based health insurance were eligible to enroll in the program. The program is provided free of cost to the overwhelming majority of affiliates.[18]

SP represented a departure from the status-quo, because it increased public health expenditures from 2.4 to 3.1 percent of GDP between 2000 and 2009. It additionally reduced inequalities in public health expenditures by redirecting federal transfers which made up to 80% of the additional funds. Specifically the law modified the transfer rules to a fixed quota per affiliate, (roughly 12% of a yearly minimum wage). As a result the gap in per capita public health expenditures between the insured and the uninsured was reduced from 2.1. to 1.2.

From the point of view of households, the program allowed them to transfer risk to the state and to improve their access to health services. In particular, the program removed a barrier to access by eliminating the fees at the point of service. It additionally created an entitlement by introducing for the first time a guaranteed package of services. The original package was composed of 84 interventions, which go from routine check-ups to third level surgeries, and a drug package deemed capable of covering 90% of the disease burden. Over time the package has been continuously upgraded, it currently offers 248 interventions and 522 drugs.

In addition to the basic package of services, SP affiliates are additionally protected by the Catastrophic Health Expenditure Fund. This fund was introduced concurrently with SP. It provides coverage for 58 high-complexity interventions that range from cancers prevalent in children, to HIV/AIDS. The fund enhances the financial protection component of SP, and

[16] A more extensive list of the bundled services include: life insurance, retirement pensions, disability benefits, housing loans, severance payments and in kind transfers such as sports, cultural facilities and day care services.

[17] Specifically IMSS extends coverage to: the spouse or partner, sons until the age of 16, or sons up to 25 if they are economically dependent or in school.

[18] It was originally envisioned that affiliates would pay a premium based on a progressive income scale, with the poorest beneficiaries being except from contributing. According to the MoH in practice less than 1% of affiliates have ever paid for the program.

improves its efficiency by creating a national risk pool for these particularly expensive conditions. Given their level of integration and their simultaneous introduction I will not distinguish in the analysis between them. However, they serve to highlight that SP was as well equipped to deal with the double burden created by the prevalence of both communicable and non-communicable diseases.

3 Theoretical Impacts on the labor market effects of SP

Two labor market decisions are expected to be affected by the introduction of SP. Among the employed it may influence their choice between formal and informal jobs, the formal-informal work margin. Among the working age population it may alter the decision to exit or enter the labor market, from here on the participation-margin.

3.1 SP and the formal-informal work margin

The effect of SP on the formal-informal work margin is often derived in the context of a compensating wage differential model where SP acts as a transfer, Azuara and Marinescu (2013); Bosch and Campos-Vazquez (2010). In these models the introduction of SP leads to an increase in the non monetary benefits associated with informal employment, thus as long as workers value these benefits, the theoretical predictions are that programs like SP should both encourage formal workers to become informal, and discourage informal workers from becoming formal.

Similar predictions can be obtained if SP is interpreted as an insurance product. In this case the main consideration is that the program will alter the relative price of insurance. Specifically, the seminal work of Gruber and Madrian (1994) suggests that the introduction of subsidized health insurance reduces the value of jobs with employer based health insurance. This occurs because subsidized health insurance reduces the rents derived from jobs that provided health insurance at a price that is lower than that which can be obtained in the private market.[19] These rents have been shown to be an important determinant of job mobility in the US context but they are unlikely to exist in Mexico. Note that as reviewed in section 2, employer-based health insurance in Mexico is financed through mandatory contributions that are the same for all firms as well as for self-employed individuals.[20]

[19] This can occur for a number of reasons: from tax brakes, to the capacity of firms to pool risk, see Currie and Madrian (1999) for a review.

[20] Private health insurance is available but very rare, according to the OECD (2005) less than 1% of the population has purchased private insurance. That said, operational rules of IMSS could have created these rents for certain sub-groups of workers. For example, self-employed individuals faced restrictions on pre-existing conditions when purchasing directly health insurance. Similarly, workers ages 60 to 65 need to contribute for at least 750 weeks (about 14 years) in order to be eligible for health insurance after retirement, OECD (2005); CLC (2010).

3.2 SP and the labor force participation margin

A labor market response to SP along the participation margin can occur through a variety of mechanisms. One key channel, is that SP allowed households to reallocate resources, previously used to cope with health shocks, towards productive activities. A version of this mechanism, for which I provide empirical evidence in section 6, is that SP reduced the burden of caring for sick dependents, thereby enabling household members to reallocate time from caregiving tasks at home to work in the labor market.

The labor market response created by SP through this mechanism is likely to be of first order importance for two reasons. First, uninsured households relied heavily on the time of household members to cope with illness. According to MXFLS health data,[21] before the introduction of SP, a typical household, with an elderly dependent and two children under the age of 7, would spend on average 12 hours per week seeking health services and caring for sick dependents.[22]

Second, as illustrated by past literature in other settings,[23] the provision of health insurance is likely to generate the largest health gains among dependents in previously uninsured households. This follows from the increased vulnerability of this sub-group of the population, and because prompt medical attention is specially effective at improving health for these age groups.

In Mexico, like in other countries with an incomplete epidemiological transition, the increased vulnerability of this sub-group of the population stems from two sources. First, a much higher exposure to communicable diseases among uninsured households, Knaul et al. (2006). Second, a much higher risk of suffering from communicable diseases for children and the elderly.[24]

Seguro Popular was well equipped to bring about health gains against communicable diseases, because prompt medical attention prevents these diseases from becoming chronic, and because it reduces the likelihood of their dissemination.

Consistent with the idea that SP could lead to improvements in the health of dependents, experimental evidence reveals that SP increased health care utilization by as much as 40% of the pre-treatment baseline, and that part of this increase was due to the substitution of private providers for SP facilities, Bernal (2014). The crowd-out of private facilities provides additional support to the idea of improvements in health, because it implies that households are no longer deterred by user fees from seeking preventive health services. And because in Mexico, as measured by clinical guidelines, private providers serving the poor have been found to be of lower quality than public ones.[25]

[21] The MXFLS is a panel survey similar to the PSID in the US.

[22] Table A2 presents health summary statistics. Table 1 uses the previous estimates to calculate the weekly hours spent caring for sick dependents, details of this calculation can be found in the appendix.

[23] See Levy and Meltzer (2008) for a review of the literature.

[24] I illustrated this feature with mortality and survey data for infectious diseases in appendix B.

[25] See, for example, Barber et al. (2007); Bojalil et al. (1998, 2007)

Evidence of the health gains that resulted from the increase in the use of SP services among dependents, comes from studies that exploit the variation generated by the rollout of SP.[26] In particular, Pfutze (2014) finds that SP led to a reduction in infant mortality that could account for as much as half of the decrease in infant mortality observed in Mexico in the last decade.[27] And Alcaraz et al. (2012) finds that, consistent with a health channel, SP led to considerable improvements in the performance of children in school.[28] Taken together the findings of this strand of the literature strongly suggest that SP is likely to have had a considerable impact on the health of dependents.

In the following section I formalize the intuition that, in a setting with missing or imperfect markets for the care of sick children and the elderly, the introduction of SP leads both to an increase in the number of hours spent working in the labor market, and to a decrease in the hours spent caregiving at home.

3.2.1 SP reduces the opportunity cost of employment

Basic Setup

I explore the mechanisms between the provision of government subsidize health insurance and the standard labor-leisure choice by extending a simple partial equilibrium household model, where households maximize utility,[29] $u(\bar{c}, \bar{f}, h)$, with respect to per capita consumption $\bar{c}$, per-capita leisure $\bar{f}$, and health h.

Household members have at their disposal T hours. They can choose to sell, H_m, hours in the labor market at a given wage w or to employ them at home, either as leisure or in home

[26] King et al. (2009) provides the first experimental evidence of the effect of SP on health outcomes, the author fails to find evidence of a general health effect, but does not test the effect of SP on health outcomes of children or the elderly. Bernal (2014) uses the same experimental variation on a matched dataset of hospital discharges and mortality records. He finds no evidence of an effect of SP on neonatal mortality, but does not test the impact of the program of infant mortality. The results of Bernal (2014) and Pfutze (2014) on neonatal mortality are not at odds with each other as the experiment did not have sufficient power to look at heterogenous effects. Moreover, the time frame of the experiment is 10 months, while Pfutze (2014) looks at effect of SP on a span of several years.

[27] According to the authorôs estimates SP reduced infant mortality by as much as 5 per 1000 live births. Interestingly, Gruber et al. (2012) find that a similar program in Thailand reduced infant mortality by 6.5 per 1000 births.

[28] Alcaraz et al. (2012) finds that SP leads increases test scores, of primary school students, by 21.5 percent of the standard deviation of scores across municipalities. This is a large effect for a non targeted intervention.

[29] It is reasonable to expect that SP will have a greater impact on members of the household that have considerable caregiving responsibilities and that this might in turn alter their bargaining power. Nonetheless, setting up the model in terms of a unitary household that chooses, $\bar{c}, \bar{l}, h$ makes the model more tractable while providing clear predictions that allow me to distinguish between a reduction in the burden and time reallocation decisions made between household members.

production activities, H_a which have a value of $q(H_a)$.[30]

The health production function $h(H_a + f, SP, M_p)$ depends on the time that household members spend at home,[31] on the parameter SP, which denotes whether the household has access to the program, and on M_p, which represents other medical inputs to which the household has access. This may range from other social programs to the availability of private doctors. Note that by introducing the health production function, $h(\cdot)$ into the utility function, leisure and home production decisions are now capable of affecting household utility directly, and indirectly through their effect on health.

The functions $u(\cdot)$, $h(\cdot)$, and $q(\cdot)$ are assumed two be twice continuously differentiable, concave, and increasing in each argument. I will additionally assume in line with the previous reasoning that inputs in $h(\cdot)$ are substitutes. And that $u(\cdot)$ is additively separable.[32]

Households face traditional time and budget constrains and decide over the number of hours that they will devote to market and home activities, H_m and H_a. The household maximization problem can be stated as follows:[33]

$$\max_{H_m, H_a} = u\left(\frac{H_m w + q(H_a)}{N}, \frac{T - H_a - H_m}{N}, h(T - H_m, SP, P_m)\right) \qquad (1)$$

Predictions

Obtaining the first order conditions of the household's problem and differentiating with respect to SP provides the following predictions:

$$\frac{\partial H_m}{\partial SP} > 0 \qquad \& \qquad \frac{\partial H_a}{\partial SP} < 0 \qquad (2)$$

In a nutshell, the model suggest that the introduction of SP decreases the household's need to spend time on the production of health, thereby lowering the opportunity cost of hours spent in the labor market. Accordingly, these conditions imply that the introduction of SP leads to both an increase in the number of hours worked in the labor market and a decrease in the hours that household members devote to home production activities. The underlying assumption driving

[30] Introducing a market for hired labor in home production, should not alter the predictions of the model since non-separability comes from the inability of household members to substitute time between labor market activities and the production of health.

[31] This implies that leisure and home production are considered perfect substitutes.

[32] This assumption can be relaxed. The predictions of the model would be the same if it was instead assumed that the value of consumption increases with health and leisure, while the value of leisure decreases with respect to health, that is: $u_{ch} \geq 0$, $u_{cl} \geq 0$ and $u_{lh} \leq 0$.

[33] Appendix D provides the step by step solution of the model.

this result is that there is incomplete substitution between market goods and the production of health. This could result from the perception that hiring non-household members to take care of dependents is risky, thus making it costly to screen and monitor individuals that would be hired to take care of dependents during their sickness spells. Consistent with this interpretation use of regular paid child care services is uncommon and expensive in Mexico.[34]

Accounting now for the composition of households and the division of labor in families yields the following additional predictions. First, in households without dependents SP should not trigger a labor market response. Second, in households were dependents greatly outnumber caregivers SP will be less effective at increasing labor supply. This occurs because these households usually include members who have specialized in caregiving. Since full time caregivers acts as a buffer in case of illness, the labor supply of households members not specialized in caregiving is less responsive to SP. Third, in all other households, members with caregiving responsibilities who are not exclusively specialized in these tasks, should benefit disproportionately from SP.

The previous predictions have been derived under the assumption of a fixed wage rate. This assumption precludes in the model the possibility that SP could have triggered an aggregated labor supply response that lead to a reduction in wages. And while my estimates of working hours may be influenced by general equilibrium effects, the existence of this effects only imply that my estimates are lower bounds of the effect of the program. This occurs because, as long as the substitution effect dominates the income effect, the reduction in wages will lead to a reduction in hours worked.[35]

3.2.2 SP and the employment decision of women

If SP operates by reducing the burden that dependents in poor health impose on caregivers, the program will disproportionately benefit women for three reasons. First, women bear the brunt of caregiving responsibilities in Mexico. MXFLS time use estimates, presented in table A1, reveal not only that a larger fraction of women preform caregiving tasks relative to men, 43% in contrast with 15%, but also that they spend more hours per week in these tasks, 32 hours in contrast with 14.

Second, in the absence of SP household frequently respond to health shocks by reallocating their time. Specifically, labor force survey estimates, presented in figure 1, reveal that family respon-

[34] Using data from the household income and expenditure survey, Calderon (2012) shows that the proportion of households that use paid child care services is only 3.84%, and the average payment was $MX\$975 \oplus US\$75 \oplus 70\%$ of the monthly minimum wage. Similarly, among uninsured households, LFS data reveals, that less than 1% employs workers to provide caregiving services or help with household shores.

[35] I additionally assume that general equilibrium effects do not affect control municipalities. Each municipality is likely to operate as a local labor market because less than 3% of survey respondents report moving to a different municipality in order to find or keep their current job. Moreover, in Del-Valle (2013) I find no evidence of SP having large spillover effects across municipal labor markets.

sibilities were the cause of 44% of all the job separation events observed among women.

Third, past literature shows not only that women, in developing economies, increase their labor market participation in response to other interventions that reduce the cost of caregiving,[36] but also that the labor supply of caregivers is specifically responsive to improvements in the health of dependents. In a closely related paper, Hanna and Oliva (2011), find that air pollution in Mexico city reduces labor supply because of its effect on health. Their estimates also reveal that pollution disproportionally affects the labor supply of caregivers, a finding that is partly explained because of the adverse effect that pollution has on the health of dependents.

Investigating the impact of SP on the labor market response of women is useful, because evidence of a differential effect across genders provides a first indication that SP is operating through the proposed mechanism. Moreover, while it is hard to identify caregivers and the extent of their responsibilities in survey data, women that differ in their marital and motherhood status, provide easily identifiable groups that can be used to reformulate the predictions derived in the previous section.

Specifically, I expect to observe that in response to SP women will increase the time they spent on the labor market, while simultaneously decreasing the time they spent at home in caregiving tasks. Moreover, I expect the magnitude of these labor market responses to vary in relation to the composition of the households as previously described.

Following the labor economics literature a first group of interest will be single mothers, and in particular those residing in multigenerational households. Since in Mexico it is common for single mothers to reside with their parents, it is important to account for living arrangements that could potentially alter the degree of attachment to the labor force, or the level of caregiving demands faced by single mothers. The second group of interest are young women with no biological children of their own, but who may nonetheless be subject to caregiving demands because of the presence of children and elderly individuals in their household.

In order to establish wether SP could disproportionally benefit these groups of women through alternative mechanisms, in section 6.2 I discuss several possibilities. (i) the reallocation of caregiving task among household members, (ii) delayed childbearing, (iii) own health effects, and (iv) the freeing up of other types of household resources.

[36] In mexico, Calderon (2012) shows that the introduction of Estancias Familiares, a government program that provides a 90% subsidy on childcare services, lead to an increase in female labor force participation as well as a reduction in the time devoted to childcare. Similar results are found in Colombia where Attanasio and Vera-Hernández (2004) evaluates a subsidized childcare and nutrition program, and in Chile where Contreras et al. (2010) analyzes the extension of the school day.

3.3 The dynamic effects of SP

Regardless of the mechanism through which SP operates its effect is likely to vary over time both because it is unlikely that individuals will be immediately aware of the availability of SP, and because it is unlikely that their initial valuation of SP services will be large enough to trigger a labor market response. Consistent with this idea, figure 4 illustrates that while the average municipal take up as a fraction of the uninsured population at the time of SP introduction is 23% it takes approximately 2 years before half of the uninsured sign up to SP.

Moreover, if the program operates by improving the health of dependents as previously argued, I expect to observe a delayed impact of SP on the labor market for two reasons. First, the increases in health care inputs roughly occured with one year of the introduction of the program.[37] Second, caregivers are unlikely to perfectly anticipate the improvements in the health of dependents, only in time, after observing the health benefits of SP can we expect them to respond in the labor market.

4 Data and Identification Strategy

4.1 Data

My source of information on the rollout of SP are administrative records from the MoH on the number of affiliations to SP by municipality and quarter. The dataset covers all the municipalities in Mexico, between 2002 and 2010. I define a municipality with access to SP as those where the threshold of 10 affiliations has been reached.[38] Figure 2 maps the rollout of SP at the national level, helping visualize the space time variation that will be used to identify the impact of the program. The rollout of SP does not appear to follow a particular spatial pattern.

The curve in Figure 3 presents the cumulative share of municipalities offering SP for each quarter between 2002 and 2010. The bulk of the rollout occurred between the official lunch of the program in 2004 and 2007 when nearly all of Mexicoôs municipalities offered the program. Figure 3 also shows the dates and frequencies of the other datasets used in this paper.

To study the effect of SP on the labor market I use repeated cross-sections from the quarterly labor force surveys (LFS) produced by the Mexican statistical office INEGI. These include the ENE that covers the 2000-2004 period and the ENOE that covers the 2005-2010 period. These

[37] Bosch and Campos-Vazquez (2010) shows that the introduction of SP to a municipality was accompanied with a considerable increase in medical personnel starting within one year of implementation. According to their estimates just with in the one year of the introduction of SP the provision of SP doctors and nurses per 1000 people increased by 5.5 pp., (10%) and 7.7 pp. (12%), respectively.

[38] This cut-off has been used by past papers and while arbitrary it does not alter the estimates of SP impact, results derived using cut-off points at 5 or 1 affiliations are available upon request.

surveys sample 120,000 dwellings per quarter in both urban and rural municipalities.[39] They have a focus and structure similar to that of the Current Population Survey, and at any given point in time, they provide information on roughly half of Mexicoôs municipalities.

Using INEGIôs municipal identifiers I then merge the LFS data with four other datasets. The first comes the MoH, it includes quarterly data on SP affiliations, and yearly data on medical personnel and infrastructure. The second is composed of detailed yearly records on public expenditures at the municipal level, this data is collected and harmonized by INEGI. The third includes detailed records on electoral results at the municipal and state level, this dataset was originally collected by Banamex and CIDAC, I have since corrected and updated this dataset from various public sources. The fourth is the DMSP-OLS satellite dataset, it is produced by NASA and NOAA and is commonly referred to as the lights by night dataset. I use several measures of visible band light to proxy measures of economic activity at the municipal-year level.[40]

For the analyses on section 5.1, which looks at the overall effect of SP on the labor market, I aggregate the previous dataset to the municipal level, and use it as a pseudo panel at that level. While the LFS survey data is not designed to be representative at municipal level this should not be a source of concern, as long as the degree to which the data is not representative is unrelated to the introduction of SP, and local level unobservable heterogeneity is accounted for. I will provide several robustness checks addressing this issue.

Next, in section 5.2, where I examine the effect of SP on labor market flows, I use the dataset at individual level, and construct labor market transitions by taking advantage of the rotating panel embedded in the LFS. This individual level panel allows me to track individuals for up to five quarters. Quarter to quarter attrition not related to the rotation of the panel is in the order of 4.4%. Attrition does not pose a threat to identification as discussed in detail in section A of the appendix.[41]

An additional problem, that affects both the analysis in section 5.1 and 5.2, is that there are important changes in the sampling and wording of questions between the ENE and the ENOE,[42] joining these datasets might lead to misleading conclusions because the variation in labor market outcomes, contains both true variation and seam-caused variation. Moreover, labor market transitions cannot be computed between 2004 and 2005 since individual level identifiers were not designed to be used across surveys. Like Calderon (2012), I will take a prudent approach and overcome this issue by dividing the analysis in two. Evidence supporting

[39] Starting on the third quarter of 2003

[40] appendix B provides details of this calculation. See Henderson et al. (2011) for evidence on the relation between measures of light and economic activity.

[41] Specifically I will show that the probability of attriting is unrelated to the introduction of SP and that inverse probability weights and manski bounds suggest that attrition does not pose a threat to identification.

[42] See INEGI (2009) for a review of the differences between the surveys.

the identifying assumptions will be derived using only the ENE dataset, while the impact of SP will be investigated using only the ENOE survey, that covers the post 2005 period.

4.2 Identification Strategy

Isolating plausibly exogenous variation

State governors played a central role in deciding the order in which SP was rolled in at the municipal level. First, because Governors could decide when to sign agreements with the federal government that would grant them access to SP federal funds. Second, because even while program guidelines suggested that priority should be given to poorer municipalities that had sufficient medical infrastructure, in practice Governors had considerable autonomy in deciding the order in which municipalities received the program.

My conversations with Mexican policy makers suggest that considerations over labor supply, and in particular over female labor supply were never factored into program placement decisions. Nonetheless, a major methodological concern that remains, is that placement decisions may not be orthogonal to other factors that could affect labor market outcomes. I address this concern in a number of ways that leads me to believe that the link between SP and labor supply is causal.

I begin by arguing that plausibly exogenous variation can be isolated by focusing on the group of municipalities that received SP in the middle of the roll-out period, that is, those municipalities that received the program between 2004 and 2005. A first indication of why the variation created by this group of municipalities can be used to derive an unbiased estimate of the counterfactual is presented in figure 8. The figure plots, in the pre-program period, the average share of workers in formal jobs by year of SP introduction. The figure reveals that those municipalities that received the program between 2004 and 2005 are similar in both levels and trends. While those that received the program in 2006 are similar in trends but not in levels, and those that received the program in 2007 are neither similar in levels or trends. Note that illustrating this point with the share of workers in formal jobs is particularly meaningful, because unlike labor market transitions, this metric is easily observable by policy makers, and is of some political importance.

In section 7, I provide further supporting evidence in favor of using the variation created by those municipalities that received SP in the middle of the roll-out period. Specifically, I show for this group of municipalities (i) that there is no correlation between the timing of SP and the time-path of all other labor market outcomes, (ii) that SP was not anticipated, and (iii) that these municipalities are similar in terms of observables at baseline.

I additionally address the threat posed by time-varying factors correlated to the timing of SP and

labor market outcomes by introducing two types of controls. First, I consider the possibility, as suggested by a number of behavioral models, that constituencies are more demanding of elected officials when they experience shocks. In this case Governors would have an incentive to respond to local economic downturns by pushing for the early implementation of SP. Since this response could potentially confound estimates of program impact I control for changes in economic activity at the municipal level. These measures are derived from the lights by night dataset and the LFS.

Second, it may also be the case that Governorôs and Mayorôs preoccupied with gaining or protecting an electoral edge, may strategically deploy SP in conjunction with other government programs and/or regulations capable of affecting the labor market outcomes. For example, the provision of SP could be accompanied with a simultaneous increase in public sector employment. I account for this type of factors by controlling for various measures of municipal government expenditures, as well as for party dummies for both Mayors and Governors.

Finally, note that federally funded programs, such as Oportunidades[43] or Estancias infantiles,[44] are unlikely to confound estimates of program impact. This follows from the fact that in the period of interest to this paper these programs are either fully rolled out or not yet introduced.

Aggregate level Specification

The variation created by the differential timing in the introduction of SP, among the group of municipalities that received SP between 2004 and 2005, is then exploited using a difference in differences design. First I investigate the overall effect of SP on the labor market using common labor market metrics aggregated at the municipal level. The main estimating equation is:

$$y_{mt} = \breve{U} + \breve{u} SP_{mt} + \mathfrak{I}_t + \mathfrak{d}_m + \mathfrak{b} x_{mt} + \mathring{U}_{mt} \qquad (3)$$

where y_{mt} is the share of workers with formal jobs in municipality m at time quarter t, SP_{mt} is an indicator variable that takes the value of one starting on the first quarter in which municipality m offers SP, $\mathfrak{d}_m$ is a municipal fixed effect, $\mathfrak{I}_t$ is a time fixed effect, x_{mt} is a vector of time-varying municipal level covariates,[45] and $\mathring{U}_{mt}$ is a random error term. This is a standard two-way fixed effects regression where identification is coming from changes in labor market outcomes correlated to changes in the introduction of SP. This research design allows me to account for both time-invariant characteristics of municipalities, and time-varying characteristics that are

[43] Is a conditional cash transfer first introduced in 1997.

[44] Is a childcare subsidy introduced in 2007.

[45] A precise definitions of the control variables, summary statistics, and a discussion of the characteristics of the sample can be found on appendix B

common between treatment and control municipalities. The identifying assumption is therefore that any unobserved time-varying covariates that affect labor market outcomes are uncorrelated with the rollout of SP conditional on the vector x_{mt}.

Accounting for the dynamic impact of SP

Next I adjust the previous specification in order to disentangle the effect of SP over time. This is important because as discussed in the section 3 the effect of SP on the labor market is unlikely to be contemporaneous with the introduction of the program. Specifically, I explore the dynamic effects of the program by progressively introducing lagged treatment indicator variables into equation 3. These variables can be denoted as $SP_{m,t+l}$ where l defines the number of quarter lags.

One interesting feature of this adjusted specification, is that the sample of municipalities that can be used to estimate the impact of SP increases as I test longer lags of $SP_{m,t+l}$. This occurs because among the group of municipalities with plausibly exogenous variation, that is, the group that received SP between 2004 and 2005, only a fraction of municipalities has within variation in the post 2005 period given the contemporaneous definition of treatment. Since this fraction increases as I use lagged definitions of treatment, the restriction of using only ENOE data becomes less binding, and I gain statistical power at each step. This gain, however, comes at the cost of deriving estimates that are not strictly comparable to each other. For example, while I am able to use 26%, of the rollout when $l = 0$, I will be able to use 43% of the rollout when $l = 4$.

Each of my estimates of $SP_{m,t+l}$ can be interpreted as the average effect of being exposed to SP between l quarters and some end point e. In principle the maximum end point e would be determined by the availability of data. However, estimates for time horizons longer than the duration of the rollout would implicitly rely on the assumption of stationarity. I follow McCrary (2007) and avoid making this assumption, by computing estimates derived from comparing changes in the outcomes of treated municipalities not only to municipalities that have not yet been treated, but also, to municipalities that will never be treated.

Note that while every municipality in Mexico received SP it is still possible to create a never treated control group in my sample. This is achieved by restricting the longitudinal dimension so that a group of municipalities that received SP in 2006 operate as a never treated control group. Accordingly my preferred set of estimates compare changes in the outcomes of treated municipalities both to municipalities that will be treated in the sample, that is, the group that received SP between 2004 and 2005, and to municipalities that will never be treated in the sample, that is, those municipalities that received SP in 2006.

In addition to allowing me to estimate the impact of the program for up to 3 years without relying on the assumption of stationarity, expanding the control group to include municipalities that received SP in 2006, allows me to increase power, and to reduce researcher degrees of freedom. The later follows from the fact that I am not choosing the end point *e*. This end point is jointly determined by the definition of treatment and by the condition that municipalities that received the program in 2006 act as a never treated control group. Table 2 provides details of the sample used to estimate each lag of the program indicator variable.

Individual level specification

I then test, with the same identification strategy, the impact of SP on labor market transitions. These transitions are defined as a change in labor market status between one quarter and the next, conditional on the individual being in the initially specified state. Since labor market transitions cannot be calculated for the first period, that is, the first quarter of 2005, the sample is restricted to those municipalities that have within variation given this additional data restriction. See table 2 for details on the sample used to estimate each lag of the program indicator variable.

The dependent variables can be classified in (i) exit from employment transitions: formal employment to non-employment[46] (FE-NE), and informal employment to non-employment (IE-NE). (ii) Entry into employment transitions: non-employment to formal employment (NE-FE), and non-employment to informal employment (IE-NE). (iii) Transitions between formal and informal jobs: formal employment to informal employment (FE-IE), and informal employment to formal employment (IE-FE). The main estimating equation is:

$$y_{imt} = \breve{U} + \breve{u} SP_{mt} + \mathfrak{I}_t + \mathfrak{d}_m + \mathfrak{b}_1 x_{mt} + \mathfrak{b}_2 x_{imt} + \mathring{U}_{mt} \quad (4)$$

where y_{imt} is one of the previously discussed labor market transitions for individual i in municipality m at time quarter t, the other set of covariates are as previously described, an additional vector of individual level covariates x_{imt} is included to increase precision. Standard errors are clustered at the municipal level unless otherwise stated. Note that each outcome is estimated on a subsample of individuals that are in a given initial state, and that the precision of the estimates will depend on the number of transitions that are observed.

[46] This includes: unemployed, discouraged, and inactive workers.

5 Results

5.1 Summarizing the impact of SP on the labor market

I begin by investigating the impact of SP on the share of workers with formal jobs. I use this aggregated labor market metric because it allows me to both summarize the effect of SP over time, and to benchmark my results against past findings.

Table 4 shows that the estimated effect of SP, up to 3 years after its introduction, is within the 0.4 to 1 percentage point reduction in the share of formal workers documented by past papers.[47] Each of the lagged program indicator variables is tested separately in order to emphasize the idea that their estimation samples are slightly different. The results presented in columns 1 to 3 support the idea that SP had no short run effects on the share of workers with formal jobs. In contrast the estimate in column 4 which test exposures to SP longer than three quarters, or of approximately 1 to 2 years, reveal that SP lead to a reduction of 0.8 percentage points in the share of workers with formal jobs. This finding is confirmed for exposures of roughly to 2 to 3 years in column 5. The estimates in table 4 are therefore consistent with the idea that, with in one year of introduction, SP leads at most to a modest decrease of 3.5% in the share of workers in formal jobs.[48]

Appendix A shows that these findings are robust to: jointly estimating the lags, excluding the never treated control group, estimating the model using a pooled fractional probit, introducing state quarter fixed effects and other time varying controls, trimming the sample, and using alternative definitions of the dependent variable.

5.2 SP increases labor supply

Having established the time frame in which SP is likely to operate on the labor market, and that my estimates are consistent with the findings of past papers, I turn to investigating the effect of SP on labor market flows. My primary interest is to distinguish between (i) the effect of SP on the decision to enter or exit employment, among the working age population, and (ii) its effect on the choice between formal and informal jobs, among those already employed.

Since the largest effect of SP on the share of formal workers, a labor market metric influenced by both types of decisions, occurs with program exposures of at least three quarters, the analysis in this section will focus on this time frame. The following set of results should thus be interpreted as corresponding to an exposure to SP of roughly 1 to 2 years.

[47] See Bosch et al. (2012) for a review of these findings.

[48] The average share of workers in formal jobs in control municipalities during the sample period is 24%.

Table 5 shows that SP increases labor supply by increasing the retention of informal workers in the labor force. It additionally establishes that the program does not alter the decisions of workers in the margin between formal and informal jobs. Column 1 shows that the probability of transitioning between informal employment and non-employment decreases by 1.3 percentage points after receiving SP. Since the average rate in control municipalities is 16%, this indicates that the effect of the program is to permanently reduce the exit flow from informal employment by 8%. In column 2 I find weak evidence that the program is also capable of increasing entry into informal employment. Specifically, the point estimate is positive but not statistically significant and roughly a third of the effect that SP has on the exit flow. The previous finding is, however, unsurprising as it is generally harder for government programs to activate workers. Columns 3 and 4 repeat the past exercise with formal employment, and columns 5 and 6 test the impact of the program on the transitions between formal employment and informal employment, and vice versa. In all four cases the point estimates are small and statistically indistinguishable from zero.

The findings of table 5 remain unchanged when I interpret them using p-values that account for the fact that 6 outcomes have been tested.[49] Specifically, with the exception of column 1, I am unable to reject the hypothesis that the SP coefficient is equal to zero, when controlling FDR at $q = 0.10$

Note that in my usage non-employment is comprised by working age individuals that are either unemployed or who are no longer searching for employment. Among those no longer searching, there are those who are immediately available for work and those who are not. I will refer to the first as discouraged and to the second as inactive. Since the labor market response of these groups of individuals is potentially very different, I refine the previous set of results by additionally testing the effect of SP on the outflows between informal employment and each of these three non-employment labor market states.

Table 6 presents the results of this exercise. Columns 1 and 2 find that the effect size of SP on transitions toward being unemployed or being a discouraged worker are very small. Column 3, by contrast, shows that SP is able to considerably reduce the flow between informal employment and inactivity, 1.2 percentage points. Given that there are very limited policy options for reactivating this type of individuals, the findings of table 6 highlight the potentially efficiency enhancing effects of SP on the labor market.

[49] See Anderson (2008) for details of the calculation of q-values, that is, p-values that account for the false discovery rate (FDR).

SP leads to an efficiency enhancing response in the labor market

Taken together the estimates of tables 4 and 5 allows me to reinterpret the finding that SP leads to a relative increase in the level of informal employment. Specifically, I find that the program does not operate by reallocating workers to less productive informal jobs, but by allowing informal workers to stay in the labor force. Hence it does not come at the cost of reducing overall efficiency.

I illustrate the magnitude of the gain in the level of output by performing a simple counterfactual calculation that allows me to convert my findings of the effect of SP in the labor market into a GDP metric. I begin by calculating the probability that an informal worker will remain in the labor force after one year.[50] I then use the estimates in table 5 to calculate what the previous probability would be in the absence of SP.[51] Next I take the difference between the observed and the counterfactual probability to determine the change in the annual probability of remaning in informal employment. For each municipality I then convert this probability into Mexican pesos. This is done by multiplying the estimate of the change in the annual probability with the number of informal workers and their average annual wage, as observed in the first quarter of 2005.[52] These municipal figures are then summed up.

To account for uncertainty in the estimated regression parameters, I perform the calculation described in the previous paragraph, using coefficients drawn from a normal distribution with mean equal to the estimated coefficient and standard deviation equal to the standard error. This procedure is then repeated 500 times, using a random draw of the coefficients each time.

The resulting simulation suggests that the increase in labor supply triggered by SP had an average value of MXN $22 billion with a standard deviation of MXN $8.8 billion. This figure roughly corresponds to a gain of USD $2.2 billion, or a 0.249 percent gain in Mexicoôs GDP at 2005 current prices.

Robustness

In appendix A I show that the estimates on which this back of the envelope is calculated are robust to: jointly estimating the lags, excluding the never treated control group, and introducing a variety of time varying controls including state quarter fixed effects. I additionally show that measurement error in the dependent variable, and quarter to quarter attrition are unlikely to

[50] The probability of remanning in the labor force after 4 quarters is given by: $(1 \boxtimes quaterly\_exit\_rate)^4$

[51] The counterfactual probability of remanning in the labor force after 4 quarters is given by:$(1 \boxtimes quaterly\_exit\_rate + SP)^4$.

[52] These estimates do not account for general equilibrium effects. This is reasonable because Azuara and Marinescu (2013) finds that SP had no effect on wages, and because the effect is driven by a group that represents a small share of the labor force.

lead to bias estimates of the impact of SP. I account for attrition both by weighting and by deriving Manski bounds. I further show in this section that weighted and unweighted estimation produces the same set of results once I account for heterogeneity in the impact of SP, a topic to which I turn to next.

6 Channels

6.1 SP enables women to stay employed

The discussion of section 3 indicated that one of the mechanisms through which SP could increase employment was to free up resources previously used by households to cope with health shocks. Given that Mexican households were potentially devoting a large fraction of their time to caring for sick dependents, and that women undertake the brunt of these responsibilities, I begin by exploring whether SP affected differentially men and women.

Figures 5 and 6 plot the point estimates and the clustered 90% confidence interval of the change in the probability of transitioning between informal employment and inactivity caused by an exposure of at least three quarters to SP, or of roughly 1 to 2 years.

Figure 5a decomposes the effect of SP between men and women. Specifically, the first coefficient is the estimate of the treatment indicator variable of equation 4 when the sample is restricted to women. The second coefficient is the estimate when the sample is restricted to men. Consistent with the intuition that SP reduced the burden created by sick dependents figure 5a shows that while SP is effective at helping women stay employed it does not have an effect for men. The estimated effect of SP for women is a 3.3 percentage point reduction in the probability of transitioning between informal employment and inactivity. Since the average level of the dependent variable in control municipalities for women is 21% this indicates that the effect of the program is to reduce this exit flow from informal employment by 15%. By contrast, the estimated effect for men is an order of magnitude smaller and statistically insignificant.[53]

Figure 5b restricts the sample to women and further explores the heterogeneity in the impact of SP for this group. The figure plots the marginal effects derived from four regressions of equation 4, where in each regression the program indicator variable was interacted with one of four sets of covariates that characterize women according to their motherhood status, their age, their marital status, and their relation to the head of the household. The figure reveals that the average effect for women conceals considerable differences among subgroups. Specifically, while both childless women and mothers are considerably aided by SP to stay in the labor force, it

[53] Interacting the program indicator variable of equation 4 with a gender dummy produces marginal effects for men and women of similar magnitude, it also highlights that the effect for women is statistically different from the effect for men. The results are available upon request.

is younger single women who are the daughters of the head of the household who seem to be disproportionately affected by the introduction of SP.

Women with caregiving responsibilities are more responsive to SP

In order to test whether the previous findings are the result of SP disproportionately aiding women with caregiving responsibilities figures 6a and 6b further characterize the effect of the program among mothers and childless women. Note that the status of childless women refers only to giving birth and not to a lack caregiving responsibilities. In fact MXFLS data reveals that more than a third of childless women care for a siblings or an older relative.

I begin by exploring the heterogenous impact of SP among mothers. Since the labor market behavior of this group of women is likely to vary with their marital status,[54] and the intensity of the demands that dependents place on them I estimate the impact of SP across these two dimensions. I gauge the intensity of the demands by employing an extended dependency ratio. I define dependents as those households members who are either less than 14 or more than 65 years old. Accordingly I define caregivers as those between the ages of 14 and 65.

Figure 6a plots the marginal effects derived from estimating equation 4 when the program indicator variable is interacted with marital status.[55] The top part of the figure reports coefficients from a regression where the sample is restricted to mothers residing in households where the dependency ratio is greater or equal than 1 to 1. The bottom part of the figure repeats the previous exercise restricting the sample to mothers residing in households where the demands of dependents are less pressing, that is, a dependency ratio strictly below 1 to 1.[56] The top part of figure 6a shows, that regardless of marital status, SP does not disproportionately affect women in households where the demand of dependents on each caregiver are likely to be large. By contrast, the bottom part of figure 6a shows that SP considerably reduces the probability of single mothers transitioning from informal employment into inactivity, -6.3 percent. The mode household in this category is a single mother residing with her parents.

Next I investigate the impact of SP on the labor market choices of childless women. The top part of figure 6b plots the marginal effects derived from estimating equation 4 on the restricted sample of childless women, and interacting the program indicator variable with the ratio of household dependents. In this case the ratio is broken up into four categories where

[54] See Gómez and Campos-Vázquez (2010) for a detailed discussion of the labor market behavior of married and single women in Mexico.

[55] The single category includes: separated, divorced and single women. The married category includes both unregistered civil partnership and registered civil partnerships.

[56] Note that there are no household without dependents in this figure.

the demands of dependents on caregivers progressively increase.[57] The figure shows that SP has u-shaped effect. Specifically, I find that in households where the dependency ratio is less than 2 to 1 the program does not disproportionately help women stay in the labor force, effect sizes in the range from -3.2 to -2.5 percent. Next in households where the dependency ratio is between 2 to 1 and 1 to 1, for example a nuclear household where an older daughter helps in the care of two younger siblings and an elderly member, I find that the program leads to a threefold decrease in the probability of women transitioning towards inactivity, -9.3 percent. Last I find that in households where the demands of dependents on caregivers are very large, that is, a ratio larger than 1 to 1, the effect of SP is once again around -2.1 percent.

The bottom part of figure 6b repeats the previous exercise this time interacting the program indicator variable with a variable that denotes their relation to the head of the household. The plotted marginal effects indicate that the bulk of the impact of SP is coming from women that are the daughters of the head of the household.

In sum, SP strongly reduces the exit flow from informal employment to inactivity for women with caregiving responsibilities. This effect, however, is mediated by the intensity of the burden created by dependents. In households where there are no dependents, or where there are more dependents than caregivers the program is less effective at keeping women employed. Two subgroups of women seem to be particularly responsive to the program: childless women caring for sibling or elderly relatives, and single mothers in multigenerational households.

SP allows women to reallocate time to the labor market

The predictions of the model, presented in section 3, indicate that if SP operates by reducing the time burden that dependents in poor health impose on caregivers, I should observe both an increase in the time they spend in the labor market and a decrease in the time that they spend at home in activities related to caregiving.

In figure 7 I test whether the time use pattern is consistent with the previous hypothesis by repeating the exercise of figure 6 this time using as outcomes: weekly hours in the labor market, and weekly hours spent at home in activities related to the caring of dependents. The coefficients plotted on the left correspond to hours in the labor market while the coefficients on the right correspond to time at home.

The results of figure 7a provide support to the idea that women are reallocating time toward the labor market. In particular, the bottom part of the figure highlights that single mothers

[57] This is done in order to estimate a more flexible model, the groups are: no dependents, less or equal than one dependent for every two caregivers, less or equal than one dependent per caregiver, and more than one dependent per caregiver.

living in multigenerational households respond to SP by increasing their labor market hours by 2.8 hours while reducing the time spent on caregiving activities by 1.5 hours.

Similarly, the top part of figure 7b reveals, that consistent with the findings presented in figure 6b, there is also u-shaped relationship between SP and the dependency ratio for these outcomes. I find that this relationship is first increasing and then decreasing for the number of hours worked in the labor market, while it is first decreasing and then increasing for the time spent at home. I also find that once again the largest effect size occurs for females in household where the dependency ratio is between 2 to 1 and 1 to 1. Specifically, the point estimates suggest that these women increase their weekly hours in the labor market by 3.6 hours while they decrease their weekly hours caring for dependents by 2.1 hours. The bottom part of figure 7b additionally illustrates that it is the daughters of the head of the household who are most responsive to the program.

On the whole, the pattern of results presented in this section support the idea that by releasing women from caregiving tasks at home SP enables women to stay employed. The estimated effect sizes are of an economically relevant magnitude, and well within the bounds of what the program was expected to achieve in terms of health outcomes. For example, a simple back of the envelope calculation suggest that, for a nuclear household where an older daughter helps in the care of two younger siblings and an elderly member, access to SP for one to two years leads to a reduction of up to one third of the time previously spent caring for sick dependents.[58]

6.2 Alternative channels.

Reallocation of time among household members

One alternative interpretation to the pattern of results documented in the previous section, is that workers with high health care costs avoid early retirement in order to retain their health insurance coverage. This could occur in Mexico, because prior to SP formal workers ages 60 to 65 needed to contribute for at least 750 weeks (about 14 years) before being eligible for health insurance after retirement, OECD (2005). In this scenario the introduction of SP would allow these workers to retire, thereby potentially enabling them to take over the caregiving tasks in the household. I rule out that SP operates through this mechanism in two ways. First, I verify that SP does not increase the transitions between formal employment and non employment for

[58] To see why this is the case note that: (i) According to table 1 before the introduction of SP this type of households spent as much as 12.2 hours a week caring for sick dependents. (ii) If the estimated reductions in the hours spent on caregiving were fully attributable to time caring for sick dependents, then we could expect the two caregiving women in this type of household to experience a total reduction of 4.2 hours.

workers ages 54 to 65.[59]

Second, I make the household the unit of analysis, and I test whether SP alters the total hours that the household spends in the labor market or the total hours devoted to caregiving. The intuition behind this test is that if the elderly are as effective at caregiving as the young, then SP would have no effect on total hours when it operates by reallocating the time of household members. Alternatively, if SP operates by reducing the burden created by dependents we should observe both an increase in the total hours spent in the labor market and a decrease in the hours spent at home.

Table 7 presents the estimates from a household level version of equation 4 where the program indicator variable has been interacted with the ratio of household dependents. The main finding, columns 1 and 2, is that for our typical nuclear household where an older daughter helps in the care of two younger siblings and an elderly member, SP leads to both an increase of 4.2 hours in the labor market and a decrease of 2.8 in the time spent at home. In accordance with the previous results, in column 3, I additionally find that SP leads to an increase in total household earning of roughly 30 dollars. Note that while this effect is small and nosily estimated it lends further support to the idea that the effect of SP on the labor market is welfare improving.

Delayed childbearing

Another way in which SP may have altered the labor market decisions of women was by altering their fertility choices. On one hand, SP may have incentivized maternity by reducing the risk related to pregnancy. The introduction of safe blood and obstetric nurses seems to have considerably reduce the risk of maternal death, Frenk et al. (2012). On the other hand, SP added three new contraceptive methods: the sub-dermic implant, the female condom, and emergency contraception. Access to these contraceptive methods could potential enable women to delay childbearing, thereby partly explaining the increased in labor force participation related to SP.

In order to determine whether this mechanism could have been operating, I test whether SP affected the likelihood of becoming a mother, or the probability of having children. Table 8 presents the estimates derived from equation 4. The dependent variables are: in columns 1 to 5 an indicator variable for being a mother, and in columns 6 to 10 the number of sons or daughters.

The table shows, that even for women who are at the peak of their reproductive age, SP does not seem to be a primary determinant of their fertility decisions. Specifically, I find that while

[59] This result is available upon request, I also verify that SP has no effect on the transition between formal employment and retirement, however, it is commonly argued that works retire progressively. See Bruce et al. (2000) for a discussion.

by and large the sign of the point estimates are consistent with the idea that SP lead to a slight increase in fertility, the estimated effect sizes are small, and not statistically significant. These findings are consistent with those of Bernal (2014) who also fails to find evidence of an effect of SP on fertility using experimental variation. I conclude that delayed childbearing cannot explain the previously documented changes in labor force participation.[60]

Own health effects

SP could also increase labor supply by improving the health of the working age population. Theoretically, in the standard setting, this is possible because health alters productivity. Thus as long as we assume that the increase in productivity that may result from SP occurs along the upward sloping segment of labor supply, and that people will not increase their consumption of leisure as a result of being in better health, models like Grossman (1972) predict that SP will lead to an increase of labor supply.

Empirically this mechanism has been hard to pin-down. Experimental evidence form Indonesia, suggest that a reduction in access to health services leads to both a worsening in objective indicators of health and to a sharp decline in female labor force participation, Dow et al. (1997). In contrast, recent experimental work in the US has failed to find evidence of an effect of medicaid on the employment of low income adults, Baicker et al. (2013).

In the case of SP while this channel could be operating, it is unlikely that it would be able to account for the overall effect of the program on the labor market for three reasons. First, while recent literature supports the view that SP improved the health of dependents, there is still no conclusive evidence indicating that SP had any effect on the health of the working age population, King et al. (2009); Barros (2008); Knox (2008).

Second, it is hard to reconcile the pattern of heterogenous impact of SP in the labor market with differential investments in health inputs. In particular, the differential effect across genders is unlikely to be explained by program features designed to tackle issues exclusive to women. Note that in addition to the efforts made to reduce maternal mortality, the only other large investment was in the detection and treatment of cervical and breast cancer. These investments are unlikely to explain the labor market response of women who take care of their siblings, both because these illnesses are relatively rare in their age group, and because these efforts were undermined by social prejudice against early detection, Frenk et al. (2012).

Third, I find no evidence suggesting that SP disproportionately helped workers in occupations or industries that involved strenuous physical ability. The intuition behind this test is that, if SP is operates by improving the health of workers then presumably those workers in jobs

[60] It is possible that longer exposures to SP may lead to changes in fertility decisions. However, corresponding estimates for other lags of SP find no evidence of this effect.

that are physically very demanding should benefit more from the program. The weakness of this test, however, is that SP may also affect the choice of occupation or industry by enabling workers to take on more physically demanding jobs.

With the previous caveat in mind, table 9 present estimates of equation 4. The dependent variable is an indicator variable for the transition between informal employment and inactivity. I implement the test by interacting the program indicator variable with a dummy for being in a physically demanding occupation, and in a different regression with a dummy for being in a physically demanding industry. The analysis is performed for both men and women, columns 1 and 2, and only on women, columns 3 and 4.

The interaction terms for the full sample, are small and strongly suggest that SP did not have any differential effect. The interaction terms for the regressions where the sample is restricted to women, are larger, but very noisily estimated, this reflect the fact that few women take jobs that are physically demanding. Since in all cases the interaction terms are not statistically significant, I conclude that SP did not benefit disproportionately workers in occupations or industries that are physically demanding.

On the whole while I cannot rule out that this mechanism could have been operating, these set of results do suggest that any gains on the labor market that resulted from improving health are at the very least partly explained by the effect that SP has on the health dependents.

Freeing up of other household resources

Given that one of the aims of SP was the reduction of out of pocket and catastrophic heath care expenditures,[61] it is also possible that the labor market response created by SP resulted partly from the ability of the program to free up household assets. The effect of SP on assets could be sizable not only because it has been shown that SP reduced out of pocket health expenditures,[62] but also, because the insurance component of SP would allow households to reallocate precautionary savings earmarked for health shocks to other uses.[63]

If these additional resources lead to an income effect, as suggested by Aterido et al. (2011b), then we should expect this effect to reduce labor supply.[64] This is important because it suggests that my estimates on labor market hours provide a lower bound of the effect of SP.

Alternatively, these resources may have also lead to an increase in labor supply because they

[61] household experience catastrophic health care expenditures when they spend more than 30% of their resources on healthcare.

[62] See Barros (2008); King et al. (2009)

[63] This mechanism was document by Chou et al. (2003) who showed that a similar program in Taiwan lead to a 13%. reduction in savings.

[64] This follows from assuming that leisure is a normal good

potentially enabled capital constrained entrepreneurs to start their own business. In order to determine whether SP additionally operates through this mechanism, I examine the effect of the program on the labor market transitions between three types of informal jobs: unpaid work, informal salaried work, and independent work. This last category includes both the owners of micro-firms and the self-employed.

Womenôs choices over these three types of jobs in the informal sector may have been altered by SP for two reasons. First, as previously argued, SP potentially encouraged self employment by freeing up resources that allowed women to setup their own micro-enterprises. Second, SP may have also encouraged work as an informal salaried worker, because the reduction in the caregiving burden allows women to take on jobs that have less flexible work schedules.

Table 10, presents estimates of equation 4 where the dependent variables are the labor market transitions among these three type of jobs in the informal sector. The sample is restricted to female informal workers. Table 10, provides evidence consistent with both mechanisms. Columns 1 and 2 suggest that SP increases the probability of transitioning to independent work. This increase, however, occurs primarily among those who are initially unpaid workers, 3.6 percentage point increase. While this result is important because it highlights that SP allowed households to engage in additional productive activities, it is to small to explain the overall increase in labor supply. Note that unpaid workers make up less than 10% of the women who work in the informal sector.

Moreover, consistent with the idea that SP operates primarily by reducing the burden of caring for dependents, I additionally find in columns 3 and 4 that SP increased the probability of transitioning to informal salaried employee, and that this effect is driven by those who where initially independent workers, 1.9 percentage point increase. Last in columns 5 and 6 I find no evidence of an effect of SP on the probability of transitioning towards unpaid work. On the whole the estimates of table 10 suggest that SP was able to trigger an increase in female labor supply because it freed up household resources. Among these resources time seems to have played a key role.

7 Internal validity checks

This section presents several tests that support the validity of the identifying assumptions of the paper. The main threat to identification is the correlation between the timing of SP introduction and the time-path of labor market outcomes. I begin by formally testing whether SP is correlated to the share of workers in formal jobs, I estimate a regression of pre-program changes in the share of workers in formal jobs on quarterly indicators of the introduction of SP to a municipality:

$$\Delta y_{mt} = \alpha + \sum_{k \geq t} \gamma_k I(SP\ \ quarter_m = k) + \lambda_t + \varepsilon_{mt} \quad \forall\ t \leq SP\ quarter_m \tag{5}$$

The dependent variable Δy_{mt} is the change in the share of workers in formal jobs in municipality m from quarter $t-1$ to quarter t. The set of dummy variables $SP\ \ quarter_m = k$ take the value of one in the quarter in which the program was introduced. Quarter fixed effects are denoted as λ_t. The data for this test is derived exclusively from the ENE dataset, and the sample is restricted to those municipalities that received SP between 2004 and 2005. The reference quarter is the first quarter of 2005. SP quarter effects that are jointly significant would indicate that the quarter of introduction is correlated to pre-program changes in the share of workers in formal jobs.

Table 11 reports the results of estimating equation 5. Column 1 shows that the timing of SP is not significantly correlated with pre-program changes in the share of workers in formal jobs, the p-value for the joint test is 0.47. Columns 2 to 8 repeat this exercise with the other labor market outcomes used in the paper, in all cases I am unable to reject the null hypothesis of the joint test. These findings strongly suggest that pre-program time trends of the labor market outcomes of interest are not correlated with the introduction of SP.

Another threat to internal validity is that SP may have been rolled out in response to sharp changes in labor market outcomes. For example, If policy makers, worried over the effect of SP on informality, chose to conceal the effect by targeting municipalities that were experiencing sharp increases in the share of workers in formal jobs, then my estimates would simply reflect reversion to the mean. I test whether there is any evidence of this type of targeting, or more broadly of anticipation effects to SP by estimating the following specification:

$$y_{mt} = \alpha + \sum_{i=1}^{16} \gamma_i I(SP\ \ quarter\ -i = t)_{mt} + \lambda_t + \delta_m + \beta x_{mt} + \varepsilon_{mt} \tag{6}$$

Where y_{mt} is the share of workers in formal jobs in municipality m at quarter t. The SP dummies take the value of 1 at $q-i$ quarters from the introduction of SP, available data allows me to estimate the effect up to 4 years before the introduction of SP. The regression includes the same set of covariates of equation 4.

The results of estimating equation 6 are presented on table 12. The dependent variable in column 1 is the share of workers in formal jobs, the point estimates in this regression are in all cases small and statistically indistinguishable from zero. Similar results are found when this exercise is repeated using as dependent variable the other labor market outcomes considered in the paper, columns 2 to 8. Given that by and large all point estimates are small and not statistically significant, I conclude that there is no evidence of any systematic anticipation

effect. I interpret the combined results of tables 11 and 12 as providing no clear evidence that the identification strategy is biased by the correlation between the timing of SP and labor market outcomes in the pre-program period.

Finally, another potential source of concern is that the impact of SP may not be homogeneous across municipalities, but rather may vary as a function of the characteristics of the municipalities. For example, workers in poorer municipalities may benefit disproportionately from the introduction of SP. This could lead to bias estimates if treatment and control municipalities are not comparable in terms of these characteristics. In Del-Valle (2013) I rule out that this could occur by showing that the economic characteristic of municipalities at baseline are unrelated to the sequence in which the program was introduced. There is therefore no evidence that the effect of SP on labor supply could be biased as a result of this issue.

8 Conclusions.

This paper shows that publicly subsidized health insurance increases labor supply, because it frees up resources previously used by household to cope with health shocks. The paper provides some of the first evidence on the existence of this labor supply effect, and of a key version of this mechanism, namely, that SP reduces the time burden of caring for dependents in poor health, thereby allowing households to reallocate time to productive activities.

I circumvent the potential endogeneity of access to health insurance, by exploiting the variation generated by the municipal level rollout of Mexicoôs Seguro Popular. I exploit this variation using a difference-in-differences design that compares changes in the labor market outcomes of individuals that reside in municipalities already reached by the program with individuals in municipalities not yet reached. I provide evidence supporting the identifying assumptions, and account for two key time-varying confounders: changes in the level of economic activity, and political targeting of the program.

My main finding is that SP increases labor supply because it reduces the exit flow from informal employment. A number of specification checks support the causal interpretation of these estimates. Consistent with the proposed mechanism, I find that the effect is driven by women with caregiving responsibilities, and that SP allowed these women to reallocate time from caregiving tasks at home to work in the labor market.

I additionally test whether this pattern of results could be caused by four alternative mechanisms. Specifically, I rule out the reallocation of time among household members and delayed childbearing as possible channels. I also provide supporting evidence consistent with the idea that own health effects and the freeing up of savings are not the primary channels of SP. However, I am unable to fully rule out these channels. These shortcomings highlight the challenge

of testing with labor force survey data, mechanisms that inherently require health and consumption data. Note that while this data is available in Mexico, because of their frequency of observation and geographical coverage, they are not well suited for an identification strategy that exploits quarterly variation in the municipal roll out of SP.

Regardless of whether there are other channels through which SP increases labor supply, the analysis in this paper highlights two important lessons. First, while it is of first order importance to determine whether the large scale provision of subsidize health insurance discourages workers from pursing formal jobs, my findings suggest that the provision of health insurance additionally operates by triggering a behavioral response that affects the decision to participate in the labor market. Accordingly, the policy discussion over the design of social insurance could be enhanced if both the formal-informal work margin, and the labor force participation margin were taken into account when evaluating the impact of these programs.

Second, the design and the evaluation of this type of programs should recognize the constrains created by the way families function in a given context. Paradoxically, it was precisely because of womenôs traditional role in Mexican families, that SP was capable of aiding in their empowerment.

Finally, while key findings in this paper hint that programs like SP are likely to be welfare improving, my reduced form estimates cannot provide a definitive answer. A stronger stance on welfare could be taken by developing a sufficient statistic that characterizes the welfare gains related to the provision of health insurance. Given that this statistic is likely to partly depend on reduced form estimates of the crowd-out effects of government subsidize health insurance, the estimates presented in this paper provide a first step in this direction. Accordingly, the objective of future work will be the derivation of this statistic.

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