Equilibrium labor market effects of non-contributory health insurance: Evidence from Mexico

Gabriella Conti* UCL and IFS
Rita Ginja† Uppsala University
Renata Narita‡ University of São Paulo §

June 15, 2015
PRELIMINARY AND INCOMPLETE. DO NOT CITE WITHOUT PERMISSION.

Abstract

In this paper we study the equilibrium labor market effects of non-contributory health insurance in the context of the recent Mexican experience. Mexico introduced in 2002 the Seguro Popular (SP), a non-contributory health insurance program directed to the 50 millions of individuals without access to Social Security. SP is essentially a transfer to the informal sector workers and to the non-employed and a tax to the formal sector workers, hence it may alter the incentives to participate in the labor market or to work in either sector. In this paper we develop and estimate a structural model of wage determination which incorporates the value of the informal sector and of non-employment relative to the formal sector. The model is estimated on the Mexican Labor Force Survey for the period before the introduction of SP. We use the estimated parameters to answer two main questions: (i) To what extent access to health care is a job amenity valued by those in the informal sector and nonemployment? (ii) How much of the increase in informality in Mexico since 2002 can be attributed to the introduction of SP? We then use the model to simulate counterfactual scenarios of employment and labor formality under alternative designs of the packages of benefits included in SP. With our results we aim to shed light on the mechanisms behind the labor market impacts of health reforms that extend coverage to individuals in the informal sector or out of the labor force.

JEL Codes: I13, J24, J3, J42, J6, O17.
Keywords: Health Insurance, Social Security, Informality, Mexico.

*Email: gabriella.conti@ucl.ac.uk
†Email: rita.ginja@nek.uu.se.
‡Email: rnarita@usp.br.
§We thank Joe Altonji, Orazio Attanasio, Jan Eeckhout and Costas Meghir for helpful comments. This paper is part of a project financially supported by the Swedish Research Council (Vetenskapsrådet), Grant No. 348-2013-6378.

1 Introduction

A central topic in the global health agenda is universal health care coverage. The World Health Organization (WHO) has defined universal coverage as access of all people to comprehensive health services at affordable cost and without financial hardship through protection against catastrophic health expenditures (WHO, 2010). The primary goal of social health insurance schemes is to protect beneficiaries from the health and financial consequences of adverse health events. Many households lack sufficient financial resources to purchase essential health care, resulting in poor health conditions. While in this sense there is scope for government intervention in providing insurance, the impacts of universal health coverage on labor markets in developing countries are less clear.

The Seguro Popular (SP) was introduced in 2002 in Mexico as a non-contributory health insurance program and it was directed to half of the country's population, uncovered by social protection or employer provided health insurance. That is, informal sector workers and the nonemployed. Prior to 2002, health insurance in Mexico was tightly linked to employment. One of the few public health insurance schemes before SP was provided through the conditional cash transfer *Oportunidades*, which targets poor families with school age children. *Oportunidades* has a component of public health insurance that includes free access to preventive health care, however families without school age children would not qualify for other public health insurance.

To be eligible to the SP, an individual needs to be non eligible to an employer provided health insurance, and this group constituted half of the Mexican population in 2002. Since these individuals could only access affordable health care through their employer, the introduction of a non-contributory public health insurance scheme could have lead to large effects on the labor market. In particular, the SP is a transfer(tax) to informal(formal) sector workers and a transfer to the nonemployed. On one hand, if the value placed on SP benefits is high, SP can lead to a negative impact on employment and/or formality rates. On the other hand, wages in equilibrium might compensate the increase in benefits in the informal sector, and in this case, the impact on formality rates is ambiguous. Thus, the labor supply and welfare impacts of a non-contributory health insurance program like SP depend on how firms in each sector adjust wages given benefits, and on allocation of workers and firms across sectors.

In this paper, we analyze the effects of non-contributory health insurance programs like SP on labor market outcomes. In particular, on employment, informality and wages. By modelling the choices of firms, that can offer formal or informal work arrangements, and the choices of workers, who can decide to be unemployed or work either in the formal or informal

sector, we are also able to analyze the welfare effects of non-contributory health insurance programs. Specifically, we consider an economy with labor market frictions where individuals can be (i) nonemployed, (ii) formal sector workers or (iii) informal sector workers. The nonemployed and informal sector workers are entitled to SP benefits and the formal sector workers receive employer-provided health insurance and other benefits secured by labor laws (for example, redundancy payment and retirement pensions). In the formal sector, firms also incur in employer-provided health provision costs.

We develop and estimate a structural model of wage determination which incorporates the value of the informal sector and nonemployed relative to the formal sector. The model is estimated on the Mexican Labor Market Survey on the period before the introduction of SP. Due to possible heterogeneity in valuation of health insurance the model is estimated for different groups based on education, gender, age, area of residence, family composition (with and without young children) and the implementation of non-contributory health insurance allows to identify the relative value attached to a job due to health insurance coverage. The Mexican case allows us to understand the mechanisms behind the labor market movements associated to the implementation of non-contributory health insurance. To do so we decompose the relative valuation attached to the informal sector and nonemployment into (i) valuation of job amenities, as access to health care services, (ii) savings in pension contributions, (iii) tax avoidance, and (iv) the value-added for the very poor relatively to the services provided by the *Oportunidades*. We then use the estimated parameters to answer to two main questions: (i) To what extent access to health care is one of the features valued by those in the informal sector and nonemployment; and (ii) How much of the increase in informality in Mexico is due to the introduction of non-contributory health insurance?. Finally, we can use the model to simulate counterfactual scenarios for welfare, employment and labor formality under alternative designs of the packages of benefits included in the non-contributory health insurance.

In the next section, we present a summary of the literature on the labor market effects of health insurance schemes not attached to the employer. In Section 3 we explain the exact details of SP and context in it was introduced. Section 4 describes the data. In Section 5 we present the broad trends in the Mexican labor market during the period before and after the introduction of SP and reduce form estimates of the labor market effects of such policy. In Section 6 we present our model and the estimation procedure used. This version of the paper includes estimates from our structural model for the period before the introduction of Seguro Popular (2000-2003) in Section 7. Conclusions are in Section 8.

2 Literature Review

The evidence on the labor market effects of SP is mixed (see the review by Bosch, Cobacho and Pages, 2012). Most studies do not find any impact on the informality rates (Gallardo-Garca, 2006; Barros, 2011; Campos and Knox, 2010, Aguilera, 2011, Duval and Smith, 2011), if anything there are small increases in the share of informal workers for those with less than 9 years of schooling, married women with children or older adults (Azuara and Marinescu, 2010, Aterido et al 2010, Prez-Estrada, 2011, Bosch and Cobacho, 2011). Aterido et al, 2010, find that SP is a associated with a reduction on the flow out of unemployment and out of the labor force, but del Valle, 2014, finds the women in families with disable or dependent individual reduce unemployment and inactivity to become informal workers.

There are few papers that analyze the effects of SP on wages, however, the few papers studying it find no effects (Barros, 2009, and Azuara and Marinescu, 2010), or a negative impact on informal wages (Aterido et al, 2010, Prez-Estrada, 2011).

Finally, regarding the effects of SP on broad measures of welfare, there is some indirect evidence through lower wages in the informal sector (Aterido et al, 2010, Prez-Estrada, 2011) and better health outcomes as decrease in neonatal mortality in rich municipalities and in postneonatal mortality in poor municipalities (Conti and Ginja, 2015), a decrease in miscarriages (Pfutze, 2013), but most studies find no effect on health outcomes (Knox 2008, King et al. 2009, Barros 2011).

Recent forms in the US health insurance system, which relaxed the link between employment and the provision of health insurance are associated to a stream of papers studying the effects of public health insurance on labor supply. Baicker et. al, 2014, use a recent expansion on the eligibility to Medicaid in Oregon and find no effect on employment, but and increase in welfare dependence. Kolstad and Kowalski, 2013d use the 2006-Massachusetts Health Reform and find compensating wage differentials due to employer provided health insurance. Garthwaite, Gross and Notowidigdo, 2014, estimate large increases in the labor supply associated to an abrupt reduction on the Medicaid coverage in Tennessee.

However, so far there is no work considering the general equilibrium effects of non-contributory health insurance on broader welfare measures and the mechanisms through which the link between employment contract and provision of health insurance operate.

Our paper relates mainly to three papers. Dey and Flinn, 2005, use a search-matching-bargaining framework to study the effect of employer-provided health insurance on mobility rates. They find that transition rates are lower for workers with jobs with employer-provided health insurance. The literature on search with formal and informal sectors is is recent but two papers are particularly relevant for our study. Albrecht, Navarro and Vroman (2009)

model formal and informal sectors following the Diamond-Mortensen-Pissarides approach, and they assume workers can only move to the formal sector from unemployment. They then use the model to simulate impact of tax policies in the formal sector. Meghir, Narita and Robin (2015) model formal and informal sectors using a Burdett-Mortensen approach, where workers and firms can choose their sector endogenously. They estimate the model and then simulate the impact of increasing the cost of informality. However, the Brazilian setup lack a *sharp policy* change, such us the introduction of non-contributory health insurance, which allows us to recover *what* workers value on the informal/non-employment status.

3 Background

3.1 The Health Care System in Mexico before *Seguro Popular*

Before the reform, health care in Mexico was characterized by a two-tiered system and about half of the population served by a contributory system and the other half served by a non-contributory system. The contributory system was (and still is) guaranteed by the Social Security Institutions such as the *Instituto Mexicano del Seguro Social* (IMSS), which covers the workers employed in the private sector, the *Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado* (ISSSTE), for the civil servants, and *Petroleos Mexicanos* (PEMEX), covering those employed in the oil industries. Health coverage is provided by these institutions in public hospitals, but these individuals could also elect to use and pay for care in private hospitals, or to buy private health insurance. In 2000, IMSS covered 40% of the population, and ISSSTE 7% of the population (see Frenk et al., 2006). Beneficiaries of social programs also had automatic access to health services (*Instituciones de Asistencia Social* such as IMSS-Oportunidades, which was provided in the infrastructure of the IMSS). However, state hospitals only offered some selected primary (ambulatory and urgent care) and secondary care (health care provided by specialists), and payment was required for most services.

Those not covered by Social Security could seek health services in either public health clinics run by the *Secretaria de Salud* (SSA) or private clinics and hospitals. Thus, in 2000, approximately 50% of health expenditures was classified as "out-of-pocket expenses" (Frenk, 2001) and 50% of the Mexican population had no guaranteed health insurance coverage. The public per capita health expenditures on the insured were twice as much as those for the uninsured (see Frenk et al., 2006). In addition, the population served by the contributory and non-contributory systems presented different health profiles (see Conti and Ginja, 2015).

3.2 The Seguro Popular

The Pilot Years. Seguro Popular (SP) was launched as a pilot program in 2002 in 26 municipalities (in 5 states) under the name *Salud para Todos*.[1] The aim was to extend the program gradually to the rest of the country. The launching states were chosen due to "the existence of high social security coverage, the ability to provide services, large concentration of semi-urban population and the existence of groups of beneficiaries of social programs", such as *Oportunidades*[2] (Secretaria de Salud, 2002). During the early stages of operation, SP targeted nuclear families[3] in the first six deciles of the distribution of income who were not entitled to social security coverage and who were residing in semi-urban and urban areas (CESOP, 2005).

According to the official registry of affiliated families, the *Padron*, during 2002 15 additional states implemented the program (Baja California, Chiapas, Coahuila, Guanajuato, Guerrero, Hidalgo, Mexico, Morelos, Oaxaca, Quintana Roo, San Luis Potosi, Sinaloa, Sonora, Tamaulipas and Zacatecas). Although their entry was not planned, these states agreed with the federal government to provide the health services covered by SP. The pilot phase ended officially on December 31, 2003 (when Baja California Sur, Michoacn, Puebla, Tlaxcala, Veracruz and Yucatn joined SP), and by then 613,938 families were enrolled in the program.

***The Ley General de Salud* (LGS).** The General Health Law was approved in early 2003, and officially implemented in January 1st 2004, effectively introducing the System of Social Protection in Health (SPSS, *Sistema de Proteccin Social en Salud*), to extend health

[1] The municipalities (states) where the program was initially rolled-out are Calkin, Hecelchakan, Tenabo, Campeche, Holpechen (Campeche), Comalcalco, Cunduacan (Tabasco), Acatic, Atotonilco, Ayotlan, Cabo Corrientes, Arandas, Encarnacion de Diaz, Jalostotitlan, Jesus Maria, Puerto Vallarta, San Julian, San Miguel el Alto, San Sebastian del Oeste, Tepatitlan de Morelos, Tomatlan, Valle de Guadalupe, Canadas de Obregon (Jalisco), Aguascalientes (Aguascalientes), Colima, Villa de Alvarez (Colima).

[2] *PROGRESA (Programa de Educacion, Salud y Alimentacin)* was launched in 1997 as the main anti-poverty program in Mexico in rural areas. It was renamed *Oportunidades* in 2002 and expanded to urban areas. The program *Oportunidades* targets families in extreme poverty in both rural and urban areas. The program has some overlap with Seguro Popular, since it consists of three components – health, nutrition and schooling, and the National Commission on Social Protection of Health (CNPSS) is also in charge of implementing the health component through three channels. First, by providing the Guaranteed Basic Health Package, which includes a set of interventions specifically tailored to individuals of different age groups and which is similar to the basic package offered under SP; second, by monitoring the nutrition of both children and pregnant women through monthly consultations (and providing nutritional supplements in case of malnutrition); third, by providing information on preventive health behaviors through community workshops.

[3] I.e., including the father, the mother and the children less than 18 years old, and eventually the grandparents over 64 years of age.

coverage and financial protection to the eligible population.[4] According to the rules of operation of the program the expansion of the coverage should prioritize areas with: (1) Low social security coverage; (2) Large number of uninsured in the first six deciles of income; (3) Ability to ensure the provision of services covered by the program; (4) Potential demand for enrollment; (5) Explicit request of the state authorities; (6) Existence of sufficient budget for the program.[5]

The Federal Government and the states share the responsibility for social protection in health, with the Federal Government (through the SSA) responsible for regulating, developing, coordinating, evaluating and monitoring health actions, and the states responsible for managing the resources allocated by the Federation for the purchase of medicines, staffing and service delivery in general.

In 2004, three more states introduced the program (Nayarit, Nuevo Leon and Quertaro) reaching 29 states. In 2005, the last three states – Chihuahua, Distrito Federal and Durango – joined SP.

Eligibility, Enrolment and Permanence in the System. Families and individuals who are not beneficiaries of social security institutions, or who have not otherwise access to health services, are entitled to enroll in SP, on the basis of their place of residence. The household is the unit of protection.[6]

Enrollment into SP is voluntary, and it is granted upon compliance with the following requirements: proof of residence in the Mexican territory; lack of health insurance, ascertained with the mere declaration of the applicant; individual ID (*CURP - Clave Unica de Registro de Población*); information necessary for the application of the socio-economic assessment tool necessary to calculate the fees for the use of services. The temporary lack of documentation associated with the three first points does not prevent the incorporation into the System, and families/individuals can be provisionally registered for up to ninety days. The effective right to use the system for beneficiaries begins on the first day of the calendar

[4]The law was published in the Federal Official Journal in April 5, 2004 *Diario Oficial de la Federacin* and revised in November 13, 2008. See `http://www.salud.df.gob.mx/ssdf/seguropopular/index/marcojuridico.php`.

[5]Diario Oficial, Viernes 4 de julio de 2003 for the *Reglas de operacin e indicadores de gestin y evaluacin del Programa Salud para Todos (Seguro Popular de Salud).*

[6]The law considers the following as household members: (i) natural and the adopted children less than 18 years of age; (ii) children and adolescents aged 18 years or less who are part of the household and have blood relations with the above-mentioned beneficiaries; (iii) the direct ancestors, more than 64 years old, who live in the same home and are financially dependent, as well as the sons or daughters until 25 years of age, single, who prove to be students or disabled dependents. Take the example of IMSS, which covers 40% of the population. If an individual is covered by IMSS, his/hers spouse is also covered (or partner if co-habiting for at least 5 years), children under 16 (or under 25 if studying) and his/hers parents if they live with the insured. Such household is not eligible for SP.

month following the date of incorporation, and it is valid for twelve calendar months. After 12 months, the family has sixty days to renew the application. Information about all individuals affiliated in the system is listed in an administrative registry, called the *Padrón*. At the the end of 2010, the *Padrn* included 43,518,719 individuals and 15,760,805 families.[7]

Funding. Between 1999 and 2007, the share of the total public health expenditures on GDP was relatively stable at 2.6% of the GDP (see figure 1). This is of the lowest ratios among the OECD countries (in 2004 in Denmark this value was 8.2%, and this is the OECD country where public health expenditures represent the largest share of GDP; in the US they represented 6.9% of GDP and 3.4% in Brazil). Between 1999 and 2004, the share of the total public health expenditures on GDP on insured (not eligible) and uninsured (eligible) was also stable at 1.8% and 0.9%, respectively. However, the share of public health expenditures on the uninsured (eligible) jumped to nearly 1.3% between 2004 and 2008, while for the insured (not eligible) this value dropped from 1.8% to 1% in the same period. This crowd of the public expenditure of the insured (not eligible) from the uninsured (eligible) was due to a failed attempted to increase public revenue to fund the SP. In fact, SP is a non-contributory health insurance system, funded by general taxes revenues, with funded based on a tripartite structure from the following sources: a social contribution (*Cuota Social*) from the federal government, solidarity contributions from both federal government and states (*Aportaciones Solidarias*) and a family contribution (*Cuota Familiar*), which was a fee introduced to replace the out-of-pocket payments made at the time of the delivery of services.[8]

The *cuota social* is an annual contribution of the federal government for each affiliated family, and it equals 15% of the daily minimum wage for Mexico City (about USD200 a year per family). This figure is very similar to the contribution for each employee affiliated with the IMSS. The solidarity contributions come from both federal and state resources: the federal solidarity contribution per household amounts to on average 1.5 times the *cuota social*[9] and the state solidarity contribution per household is half of the *cuota social*. Finally,

[7]According to a survey in nine states, Baja California, Campeche, Distrito Federal, Guerrero, Hidalgo, Jalisco, Querétaro, Morelos and Zacatecas the main reasons for affiliation are access to free medicines and access to primary care at reduced costs (see Nigenda, 2009).

[8]The tripartite funding structure is similar to that adopted by the two major social insurance agencies in Mexico, IMSS and ISSSTE. Public health expenditures in Mexico can be divided in two groups: (1) public health expenditures for the insured population, including the health expenditures for IMSS, ISSTE and PEMEX; (2) public health expenditures for the uninsured population, including the federal and the state health expenditures.

[9]The federal solidarity contribution is computed based on the following components: (i) number of beneficiary families; (ii) health needs, according to state's indicators of infant and adult mortality; (iii) additional contributions to institutions, which are called the "state effort" (*esfuerzo estatal*); and (iv) the performance of health services.

families may be exempt from payment of their contribution if they are deemed too poor.[10] In practice, in 2010 96.1% of the enrolled individuals are in the two first deciles of income distribution, and thus exempts from paying the family contribution.[11]

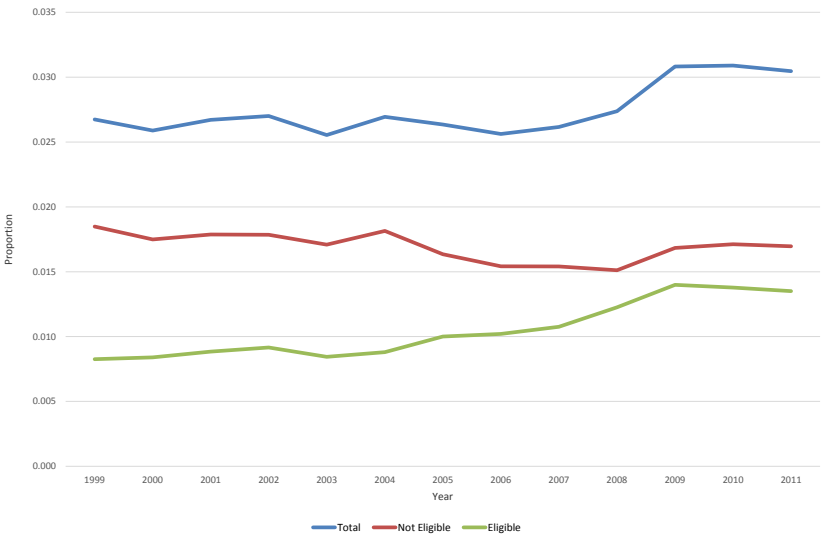
Use of Funds: Services and Health Conditions Covered by SP. The beneficiaries have access to a package of health services and interventions with approved providers. The number of interventions and conditions covered increased from 78 in 2002 to 284 in 2012 (see Conti and Ginja, 2015). The interventions covered can be broadly classified into nine types, according to the type of interventions and services. These areas of coverage are: (1) preventive actions, as vaccination and as medical check-ups, (2) ambulatory care, including general consulting and specialty services for the diagnosis, treatment and rehabilitation of infectious and chronic diseases, (3) dental interventions for all ages the removal of caries, removal of focus of infection and abscesses, and tooth extraction; (4) family planning; (5) prenatal, obstetric and perinatal care; (6) physical rehabilitation; (7) emergency care (situations that require immediate attention because they can endanger life and it includes diagnosis and treatment in the emergency room, inpatient hospital admission or surgery); (8) hospital care for pathologies requiring hospitalization; and (9) general surgery, for acute problems and chronic conditions, including diagnoses of major surgical frequency of gastrointestinal, gynecological, obstetric, genitourinary, ophthalmic, dermatological and orthopedic pathologies.

In November 2004 it was introduced the *Fondo de Protección contra Gastos Catastroficós (FPGC)* to complement the basic coverage. The FPGC is a reserve fund of unlimited budget with the objective to support the financing of care for high-cost diseases – such as breast and womb cancers, and several cancers in children and adolescents (in Mexico cancer was associated with 15% of the deaths among children and adolescents in 2000). The conditions

[10]The annual fee to be paid by each family is progressive and based on the average household income relative to the national income distribution (the verification of the income decile for each affiliated family is held every three years). Families exempted of payment are those (i) with a disposable income in bottom 20% of the distribution of national income; (ii) enrolled in federal programs to combat extreme poverty; (iii) residents in rural areas of very high marginalization with less than 250 inhabitants, and (iv) other specific requirements set by the CNPSS.

[11]The use of the resources administered by Seguro Popular is regulated by the *Ley General de Salud*, which mandates the following partition of the resources: 89% must be transferred directly to the state governments; 8% must be transferred to the state governments through the FPGC; and 3% of the resources are transferred to the state governments through the *Fondo de Previsión Presupuestal* (Provident Budget Fund), to meet the infrastructure needs for basic primary care and in poorer states and to address unforeseen differences in the demand for services during each fiscal year. Of the 89% of the resources that are directly transferred to state governments the Public Sector Budget establishes spending limits. For example, since 2010, some of the limits are: 40% for wages of the personnel involved in providing health care for the affiliated; 30% to be used for acquiring medical supplies; 20% to be used for preventing and detecting diseases covered by SP; 6% to be used for operational expenses.

Figure 1: Public Health Expenditures as fraction of GDP: SP funded by general taxation.



Note: The total public expenditure in health is the sum of the public expenditure in insured population, which includes the expenditure with the population affiliated at IMSS (Instituto Mexicano del Seguro Social), ISSSTE (Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado) and PEMEX (Petrleos Mexicanos), and the uninsured population. The public expenditure in the uninsured population includes both the federal and states expenditures; the federal expenditure includes (1) funds for the Ministry of Health (from the called *Ramo 12*), (2) the FASSA (*Fondo de Aportaciones para los Servicios de Salud*) or funding for the health services and (3) the funds for IMSS-Oportunidades (from the called *Ramo 19*).

covered under this fund were chosen based on the cost-effectiveness of available interventions and the costs associated with prematurity of possible death and disability, not only to the individual but also to his/her family. On December 1^{st} 2006, during his inaugural speech, President Calderón announced the *Seguro Medico para una Nueva Generación* (SMNG). This represented an expansion of SP coverage for children under age five born in eligible families from that day onwards. The conditions covered by SMNG were first specified in 2008 and they are mainly associated with the perinatal period.

The use of the resources administered by Seguro Popular is regulated by the *Ley General de Salud*, which mandates the following partition of the resources: 89% must be transferred directly to the state governments; 8% must be transferred to the state governments through the FPGC; and 3% of the resources are transferred to the state governments through the *Fondo de Previsin Presupuestal* (Provident Budget Fund), to meet the infrastructure needs for basic primary care and in poorer states and to address unforeseen differences in the demand for services during each fiscal year.[12]

In Mexico, the non-contributory and the contributory systems have separated networks of hospitals and health centers to serve the eligible population of each system. The average number of doctors and nurses per potential use not very different in the non-contributory system (SP) and the contributory system (IMSS, ISSSTE, PEMEX and other small providers). In the Ministry of Health medical units, which are responsible to deliver the SP services, in 2000 there were .76 (SD 0.87) doctors or nurses per 1000 individuals eligible, and there were on average .46 (SD 0.80) doctors or nurses per 1000 individuals eligible to services in contributory system.[13]

Once a family is enroled in SP, she is assigned a health center (which, in turn, is associated to a general hospital) and a family doctor for primary care. Table A in Appendix presents the number of families enrolled per medical unit in each year. This table shows that there is a large variability in the number of families assigned to a health center and a hospital (overall, the standard deviation for the number of families is 1,496 and 22,206 per health center and hospital, respectively). There is also an increase in the number of families served by hospitals with the expansion of the program, with a relatively larger increase in the right

[12]Of the 89% of the resources that are directly transferred to state governments the yearly Mexican Public Sector Budgets establishes spending limits only. For example, since 2010, some of the limits are: 40% for wages of the personnel involved in providing health care for people affiliated to Seguro Popular; 30% to be used for acquiring medical supplies; 20% to be used for preventing and detecting diseases covered by SP; 6% to be used for "operational"expenses.

[13]Data for medical personnel by type of health provider comes from the the SIMBAD data set (*Sistema Estatal y Municipal de Bases de Datos* - State and Municipal System Databases). Information on the potential population in the non-contributory system (SP) and the contributory system (IMSS, ISSSTE, PEMEX and other small providers) from the CONAPO (Consejo Nacional de Población - National Council for Population.)

tail of the distribution for hospitals, suggesting a potential risk of overcrowding of larger units, whereas the increase in the number of potential users of health centers is uniform across the distribution.[14] Finally, a typical a health center serves more than one locality, so individuals may have to seek care outside their locality of residence. The average health center serves SP families in 13 localities per year and the average hospital serving SP families serves 196 localities per year.

4 Data

In this paper we use data from three main sources.

Padrón This is a consolidated registry of all families with a valid enrolment in Seguro Popular by December 31st of each year since 2002 (we have data until 2010) and it is used by the Federal Government and by the States to decide the funds to be allocate to the program. The key treatment variable – the date of implementation of SP in each municipality – is constructed from this data. The data contains detailed demographic and socioeconomic characteristics of the enrolled families, including employment status, occupation and assets. It also contains information on the exact date of affiliation, residence and he identifiers of the health center and general hospital assigned to each family at the time of enrolment in the program.[15] The exact date of affiliation of families is used to construct the date of implementation of the program in each municipality. We consider that a municipality has SP when the number of families affiliated to the program is at least 10 (our results are not sensitive to this definition and we present in Appendix robustness checks using alternative definitions of at least 2 or 5 families enrolled per municipality).

Encuesta Nacional de Empleo (ENE) 2000-2004 and Encuesta Nacional de Ocupación y Empleo (ENEO) 2005-2012 We use quarterly data from the National Employment Surveys of Mexico, which is a rotating panel of households. There are two periods of implementation (ENE for 2000-2004) and (ENOE for 2005-2012). It is nationally representative but, strictly speaking, the ENE survey had an adequate frame only for the urban

[14]Not all families in SP are assigned to health centers run by the Health Ministry. Of the total of 17.6 million families observed in the data, about 816,000 are assigned to IMSS-Oportunidades' centers when they enroll in SP (less than 5% of the families) and 3.7 million of those families that entered SP through the Oportunidades program (about 22% of the total). Additionally, less than 0.03% of the families are assigned to IMSS and private health centers when first registered in SP.

[15]For the years 2002 and 2003 (in which the program ran as a pilot), only information on the date of enrolment and on the state of residence was recorded for each. However, it is possible to identify the exact date of implementation of SP in a given municipality since each family has a unique identifier. Thus, it is possible to link families across years.

population. The data includes a rotating panel at the individual and household level (2000-2012) and it covers more than 10 million individuals from the second quarter of 2000 to fourth quarter of 2012 between 23 and 65 years old in 1404 municipalities across the country. About 100,000 households are covered per quarter.

From this data we observe the social security status of a specific individual changes status across quarters. We consider that an individual is an informal worker if he/she does not have access to health services provided by his/her job through on of the social security institutions in the country (IMSS, ISSSTE or PEMEX). In addition to access to social security coverage through his or her job in this data we also observe whether the individual is covered by social security through the spouse.

We use this data set to identify two types of transitions: if the social security status of a specific individual changes status across quarters and whether he/she switch jobs (within or across the formal and informal sectors).

Encuesta Nacional de Ingresos y Gastos de los Hogares-ENIGH We use the National Expenditure and Income survey (for the even years between 1998 and 2012), which is a representative sample of both rural and urban households, to obtain the mean expenditure per individual on health insurance. We obtain the mean expenditure per individual by gender, for three age groups: 20-29, 30-39 and 40 or over. We use this expenditure as a proxy for the firms cost to provide health insurance to each formal worker. We choose these three age groups based on the type of same age breakdown of the services offered by SP.

Other data sets We collected information from five administrative data sets, which we use to characterize the municipalities which introduced SP in different years. First, we use administrative data on all death certificates, which are assembled by the civil registry and the public prosecutor (in case of accidental or violent deaths) in the entire country. The data contains information on the exact date, place and cause of death, the registration date as well as age, gender, type of health insurance and residence of the deceased, for the years 1994-2001.[16] We use this data to correlate the date of implementation of SP with the number of deaths at different ages. Second, we use data on all fetal deaths between 1988 and 2001[17] A fetal death is a death that occurs before complete expulsion or extraction of the fetus from the mother, regardless of the duration of pregnancy. The death is indicated by the fact that after delivery the fetus does not breathe or show any other sign of life. The Certificate of Fetal Death contains at least information on the gestational age of the fetus. Third, we

[16]We downloaded the data from the SINAIS website: `http://sinais.salud.gob.mx/mortalidad/`.

[17]The was obtained from the SINAIS website: `http://www.sinais.salud.gob.mx/basesdedatos/stdmuertesfetales.html`.

use data on all births occurred (and registered) in Mexico between 1998-2001.[18] Fourth, we use the universe of Hospital Discharges from the Health Ministry (*Secretaria de Salud*), for 2000.[19] We use this data to correlate the timing of implementation of SP with the health status of those seek care in the hospitals run by SSA before the introduction of SP. Finally, we use data on the universe of all physical and human resources for all outpatient and inpatient units administered by the Health Ministry for 2001.[20] We use this to correlate the timing of implementation of SP with the supply of health services available in the municipality.

5 Main labor market facts

In this section we present some basic facts regarding the labor market in Mexico. To document these basic facts we use quarterly data from the Mexican Labor Force Survey ENE-ENOE for the period of 2000-2012 (see section 4). In all results presented below we restrict the sample to adults ages 23-65 years old with at most primary education. This restriction implies that we use half of the sample, in particular, our sample includes 3,617,609 observations.

We consider that in each moment an individual can be (1) unemployed or out-of-the-labor-force, (2) work in the formal sector or (3) work in the informal sector. We consider that an individual is an informal worker if he/she does not have access to health services provided by his/her job through on of the social security institutions in the country. In addition to access to social security coverage through his or her job in this data we also observe whether the individual is covered by social security through the spouse.

5.1 Trends in Employment Composition

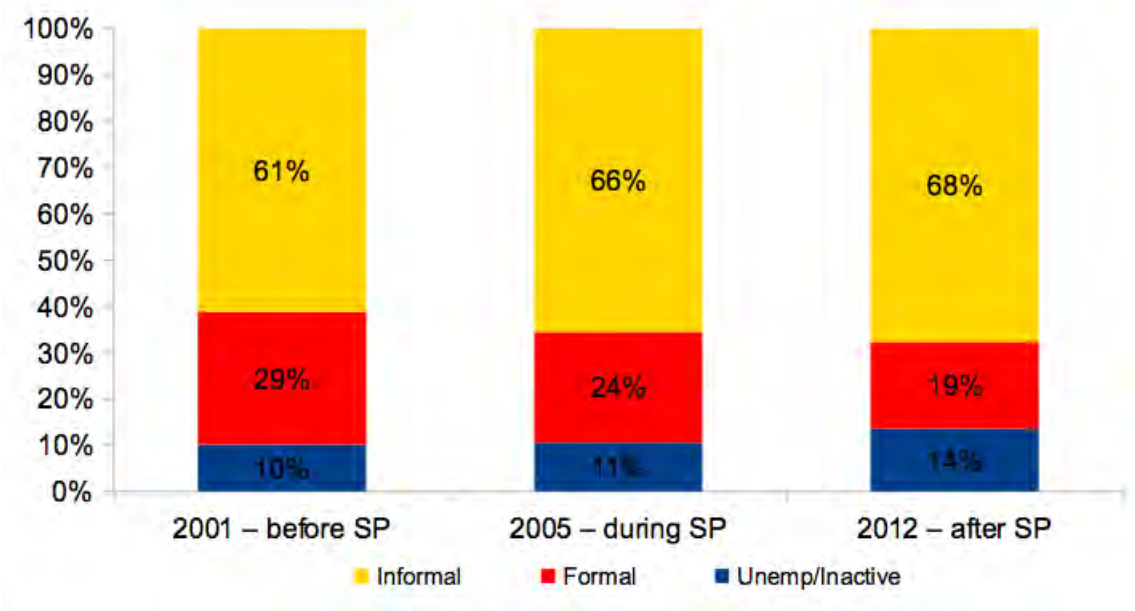
We start by presenting in figures 2 and 3 the average share of individuals in the sample that are unemployed or out-of-the-labor-force and whether they work in the formal or informal sectors. We present statistics separately for females and males and for three years: 2001 (the year just before the introduction of SP), 2005 (a year in which all states were already had introduced SP, but in which only 57% of municipalities had SP - see table A in Appendix) and for 2012, where the program has already reached all eligible individuals.

[18]The was obtained from the SINAIS website: `http://www.sinais.salud.gob.mx/basesdedatos/stdnacimientos.html`.

[19]The data was obtained from `http://www.sinais.salud.gob.mx/egresoshospitalarios/basesdedatoseh.html`.

[20]The data was downloaded from the SINAIS website: `http://www.sinais.salud.gob.mx/basesdedatos/recursos.html`.

Figure 2: Employment composition: Men ages 23-65 with at most primary education



Note: Percentage of individuals by job status at the date of first interview.

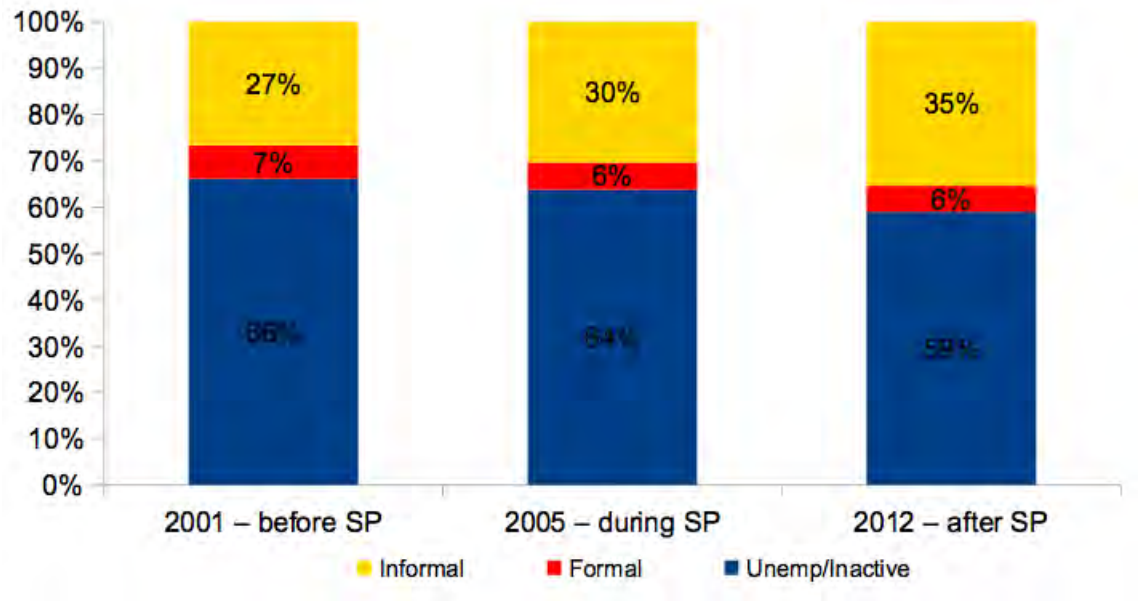
Figure 2 shows that about 2/3 of the working age males in Mexico have informal work arrangements. In terms of changes in changes in the composition of the (potential) labor force, between 2001 and 2012 among males there was an increase in the share of informal workers of 7pp and a decrease of 10pp in the share of workers employed in the formal sector. The share of unemployed or inactive males remaind more or less constant.

Figure 3 shows that about 2/3 of the working age women in Mexico are either unemployed or out of the labor force (this figure is similar in other Latin American countries. The figure also shows that between 2001 and 2012 among females there was an increase in the share of informal workers of 8pp and a decrease of 77pp in the share of women unemployed or out of the labor force. The share of women working in the formal sector remaind more or less constant.

To understand the changes in the composition of labor force detected above, we now turn to analyze quarterly transitions between status. Figures 4 and 5 present the share of workers according to their status in two periods: the first quarter they are interviewed and the immediate quarter. Although figures 2 and 3 refer to stocks while figures 4 and 5 present transitions between two quarters, the latter provide at least a partial explanation for the changes in the composition observed between 2001 and 2014.

Figure 4 shows that among males there is an increase in the flow out of the unemployment pool to informality between 2001-2012, which can (at partially) explain the increase in the share of informal workers found in figure 2. Simultaneously, we document a decrease in the

Figure 3: Employment composition: Women ages 23-65 with at most primary education



Note: Percentage of individuals by job status at the date of first interview.

Table 1: Log Mean Wages: individuals ages 23-65 with at most primary education

Year	Males			Females		
	Formal	Informal	Diff.	Formal	Informal	Diff.
2001	8.51	8.28	0.23	8.19	7.60	0.58
2005	8.55	8.25	0.30	8.24	7.66	0.58
2012	8.44	8.10	0.34	8.11	7.63	0.48

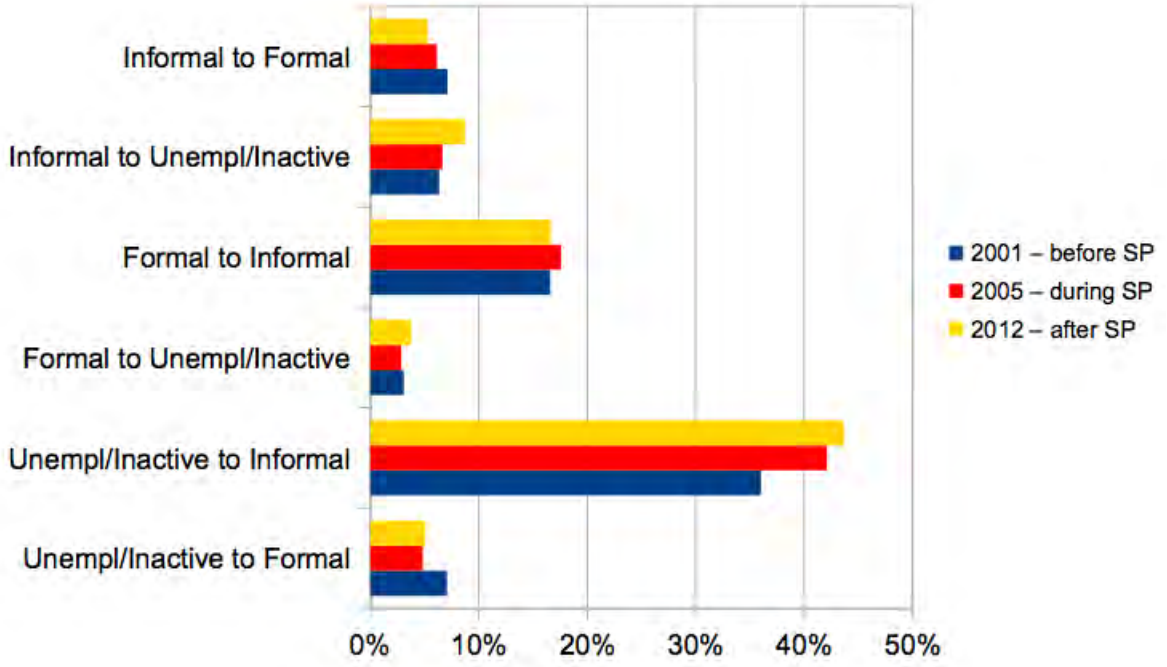
Note: Values in log of Mexican Pesos in 2011.

flow out of the unemployment pool to formality.

Figure 5 shows that among women there is a decrease in the flow out of the informality pool to unemployment between 2001-2012, together with an increase in the flow out of the unemployment pool to informality. These two transitions are consistent with the reduction in the pool of unemployed/inactive women and increase in the share of woman with informal work arrangements.

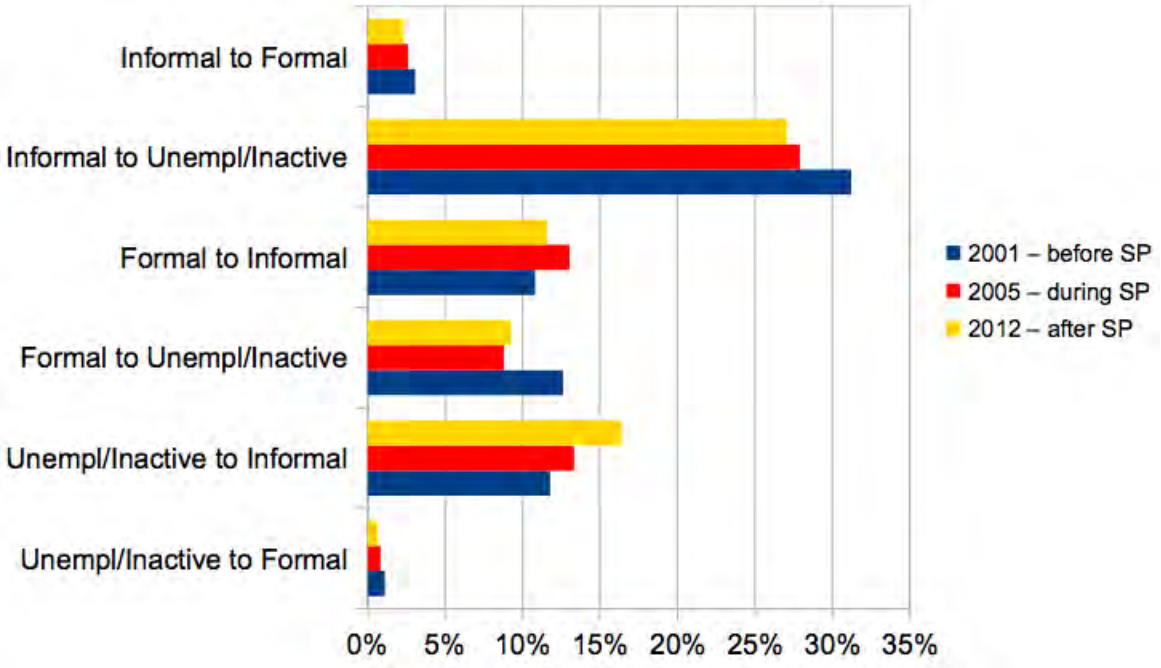
Finally, we summarize the changes in wages. Table 1 shows that average wages in the informal sector decrease in 2001-2005 for males, which correspond to the years of the initial rollout of SP. This was a period of economic growth, since the average wage is rising in all other cells in the table. Also, there is an increase in the wage gap for males between formal-informal sectors, but do not for females.

Figure 4: Transitions (per quarter) : Men ages 23-65 with at most primary education



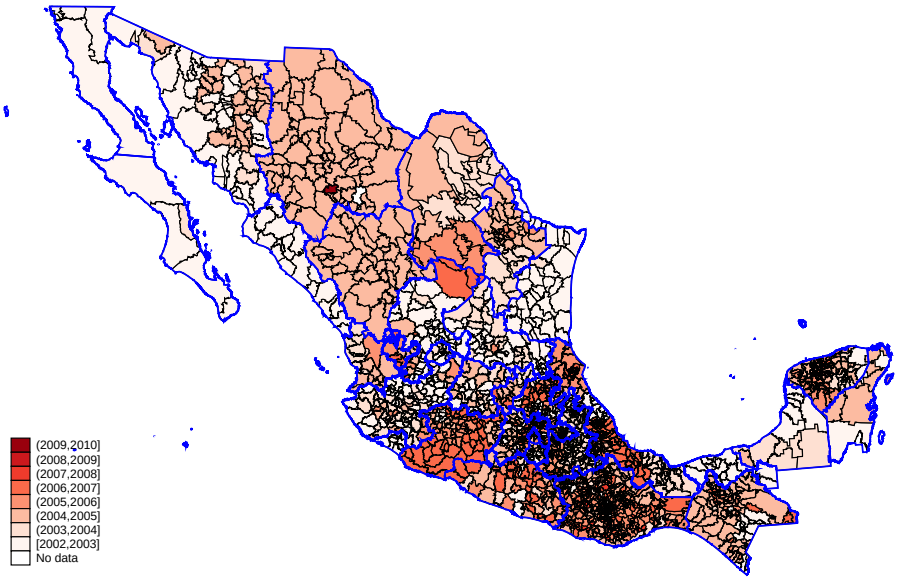
Note: Percentage of individuals by job status at the date of first interview.

Figure 5: Transitions (per quarter) : Women ages 23-65 with at most primary education



Note: Percentage of individuals by job status at the date of first interview.

Figure 6: Year of implementation of SP by municipality.



5.2 Reduced Form Estimates

Before moving to our structural estimates, we exploit the variation in the timing of implementation of SP at the municipality level. We analyze both the stock variables (that is, the share if formal and informal workers in a municipality-quarter and unemployed) and transitions.

Figure 6 displays the year of implementation of SP in each municipality in Mexico, between 2002 and 2010 (see Conti and Ginja, 2015, for details about the rollout of the program). This graph shows that there is considerable variation, both across municipalities and over time, regarding the timing of the adoption of SP in different municipalities in the country. Thus, we start with a basic specification which is a difference-in-differences model, where we compare changes in outcomes for individuals that reside in municipalities that introduced SP in different years between 2002 and 2010. The unit of analysis is the set at municipality-quarter level and we estimate:

$$y_{mst} = \beta SP_{mst} + \gamma X_{mst} + \mu_{ms} + \pi_t + \varphi_s t + \varepsilon_{mst} \tag{1}$$

where m indexes the municipality of residence, s the state, t indexes the quarter. SP_{mst} is an indicator variable equal to one if municipality m in year t has implemented SP. In all our data sets the municipality of residence is measured in quarter t.

Because municipalities adopted SP at different times, we compare those with or without SP access at the time of survey by virtue of their municipality of residence. Thus, we can

allow for unrestricted municipality effects μ_{ms}, which control for unobserved determinants of y_{mst} that are constant at municipality level and which affect the outcome independently of SP; unrestricted quarter effects π_t and state-year effects $\varphi_s t$ to account for state (quadratic) trends which affect outcomes independently of SP (such as federal-state budget agreements independent of SP). The parameter of interest is β, the effect of exposure to SP, which is identified from variation across municipalities and quarter. We also control for X_{mst} are municipality-specific observable characteristics, in particular, we control for the share of males and in a given age per municipality-quarter. ε_{mst} are idiosyncratic shocks. The standard errors are clustered at municipality level to account for autocorrelation in the outcome (Bertrand, Duflo and Mullainathan, 2004). All our estimates are intention-to-treat effects.

Table 2 shows that SP is associated with an increase of 1.3pp in the share of informal workers ages 23-39 in a municipality.

When we turn to transitions (see tables 3-5), we only find that SP is associated with a decrease of 1.3pp in the flow of women out of unemployment/inactivity to informality (driven by women 40-65 years old; see table 5).

Table 2: The impact of Seguro Popular on informality rate of municipalities.

	(1)	(2)	(3)	(4)	(5)	(6)
	Share of Unemployed/Inactive		Share of Formal Workers		Share of Informal Workers	
Sample	Males	Females	Males	Females	Males	Females
			Panel A: 20 to 65 years old			
1[SP=1]	0.005	-0.002	-0.021***	0.002	0.016*	-0.000
	(0.007)	(0.008)	(0.008)	(0.005)	(0.009)	(0.007)
Observations	26,444	26,717	26,444	26,717	26,444	26,717
Mean 2000	0.157	0.698	0.186	0.0425	0.656	0.259
			Panel B: 23 to 39 years old			
1[SP=1]	-0.010	-0.001	-0.020*	0.003	0.030**	-0.002
	(0.008)	(0.012)	(0.012)	(0.008)	(0.012)	(0.011)
Observations	20,272	21,494	20,272	21,494	20,272	21,494
Mean 2000	0.0510	0.686	0.258	0.0593	0.691	0.255
			Panel C: 40 to 65 years old			
1[SP=1]	0.003	0.003	-0.025**	-0.003	0.022*	-0.000
	(0.008)	(0.010)	(0.011)	(0.008)	(0.013)	(0.008)
Observations	22,652	23,042	22,652	23,042	22,652	23,042
Mean 2000	0.133	0.670	0.193	0.0417	0.675	0.288

Note: Estimates obtained using the ENE/ENEO data, aggregated at municipality-quarter level. Each cell represents results for separate regressions. Controls excluded from table include: quarter fixed effects, municipality of residence fixed effects, state quadratic trend, the proportion of individuals by age and by marital status.
Standard errors are clustered at the level of the municipality. *** Significant at 1%, ** Significant at 5%, * Significant at 10%.

Table 3: The impact of Seguro Popular on labor market transitions (adults ages 20-65).

	(1)	(2)	(3)	(4)
Sample	Males	Females	Males	Females
	Panel A: From Unempl/Inactivity to			
	Formal		Informal	
1[SP=1]	0.005	-0.001	-0.004	0.004
	(0.006)	(0.002)	(0.016)	(0.006)
Observations	15,228	22,391	15,228	22,391
Mean 2000	0.0306	0.00987	0.309	0.117
	Panel B: From Formal to			
	Unempl/Inactivity		Informal	
1[SP=1]	0.002	-0.022	0.015	-0.016
	(0.005)	(0.015)	(0.014)	(0.015)
Observations	12,793	7,128	12,793	7,128
Mean 2000	0.0342	0.112	0.199	0.142
	Panel C: From Informal to			
	Unempl/Inactivity		Informal	
1[SP=1]	-0.008	0.016	-0.008*	0.001
	(0.007)	(0.011)	(0.004)	(0.004)
Observations	21,831	19,288	21,831	19,288
Mean 2000	0.0798	0.327	0.0562	0.0266

Note: Estimates obtained using the ENE/ENEO data, aggregated at municipality-quarter level. Each cell represents results for separate regressions. Controls excluded from table include: quarter fixed effects, municipality of residence fixed effects, state quadratic trend, the proportion of individuals by age and by marital status.
Standard errors are clustered at the level of the municipality. *** Significant at 1%, ** Significant at 5%, * Significant at 10%.

Table 4: The impact of Seguro Popular on labor market transitions (adults ages 20-39).

	(1)	(2)	(3)	(4)
Sample	Males	Females	Males	Females
	Panel A: From Unempl/Inactivity to			
	Formal		Informal	
1[SP=1]	-0.044	-0.008	0.100*	0.006
	(0.042)	(0.006)	(0.058)	(0.010)
Observations	3,787	17,026	3,787	17,026
Mean 2000	0.149	0.0153	0.582	0.130
	Panel B: From Formal to			
	Unempl/Inactivity		Informal	
1[SP=1]	-0.006	-0.010	-0.005	0.003
	(0.007)	(0.021)	(0.025)	(0.024)
Observations	8,136	4,130	8,136	4,130
Mean 2000	0.0288	0.120	0.213	0.129
	Panel C: From Informal to			
	Unempl/Inactivity		Informal	
1[SP=1]	0.010	0.031*	-0.009	-0.006
	(0.007)	(0.016)	(0.010)	(0.009)
Observations	15,905	12,471	15,905	12,471
Mean 2000	0.0456	0.310	0.0771	0.0341

Note: Estimates obtained using the ENE/ENEO data, aggregated at municipality-quarter level. Each cell represents results for separate regressions. Controls excluded from table include: quarter fixed effects, municipality of residence fixed effects, state quadratic trend, the proportion of individuals by age and by marital status.
Standard errors are clustered at the level of the municipality. *** Significant at 1%, ** Significant at 5%, * Significant at 10%.

Table 5: The impact of Seguro Popular on labor market transitions (adults ages 40-65).

	(1)	(2)	(3)	(4)
Sample	Males	Females	Males	Females
	Panel A: From Unempl/Inactivity to			
	Formal		Informal	
1[SP=1]	0.012	0.000	-0.003	-0.001
	(0.010)	(0.002)	(0.030)	(0.006)
Observations	10,298	19,550	10,298	19,550
Mean 2000	0.0395	0.00646	0.370	0.129
	Panel B: From Formal to			
	Unempl/Inactivity		Informal	
1[SP=1]	0.008	-0.027*	0.013	-0.016
	(0.009)	(0.014)	(0.017)	(0.017)
Observations	10,330	5,641	10,330	5,641
Mean 2000	0.0321	0.0998	0.179	0.142
	Panel C: From Informal to			
	Unempl/Inactivity		Informal	
1[SP=1]	-0.011	0.008	-0.005	0.004
	(0.009)	(0.013)	(0.006)	(0.006)
Observations	19,044	16,720	19,044	16,720
Mean 2000	0.0747	0.327	0.0508	0.0239

Note: Estimates obtained using the ENE/ENEO data, aggregated at municipality-quarter level. Each cell represents results for separate regressions. Controls excluded from table include: quarter fixed effects, municipality of residence fixed effects, state quadratic trend, the proportion of individuals by age and by marital status.
Standard errors are clustered at the level of the municipality. *** Significant at 1%, ** Significant at 5%, * Significant at 10%.

6 Model and Estimation

We consider an economy with labor market frictions and follow the wage-posting approach proposed first by Burdett and Mortensen (1998). That is, the firms offer a contract which the worker may accept or refuse. There is random search, and workers search while nonemployed and *on-the-job*. Firms are ex-ante heterogenous, and they can choose to post a formal or an informal contract to the worker. The two types of contract, which define two sectors in the economy arise because of the existence of taxes and regulations governing the employment of workers. The policy environment is described by the income tax (ρ), social security contributions (τ), severance pay upon laying off a worker (s), and employer-provided health insurance cost (ϕ). All these features can be avoided when the worker is employed informally.

Time is continuous and workers seek to maximize their expected lifetime income. An individual can be: nonemployed (n), formal (f), or informal (i) and individuals have instantaneous utility given by $u(y, v) = y + v$, where

- $y = w$ if they work and
- $y = b$ if they are nonemployed

We assume v varies according to job status. In particular, (i) $v = \gamma_{NF}$ if the individual is nonemployed or in the informal sector and (ii) $v = \gamma_F$ for those employed in the formal sector. For simplicity, γ_F is normalized to zero and $\gamma_{NF} = \gamma$ is the relative value of being outside the formal sector. We interpret it as the *marginal willingness to pay* for health insurance coverage outside the formal sector, but this could capture other dis/amenities as well. Later we show how we use health data to identify the health insurance value.

The value of employment in the formal sector can be written as

$$\begin{aligned} rW_f(w) = w(1-\rho) + \delta_f \left[W_n + s \times w - W_f(w)\right] \\ + \lambda_{ff} \int \max\left\{x - W_f(w), 0\right\} dF_f(x) + \\ + \lambda_{fi} \int \max\left\{x - W_f(w), 0\right\} dF_i(x) \end{aligned}$$

where, w is gross wage before pensions contributions, ρ is the income tax rate and s is the expected severance benefit. λ_{fi} (λ_{ff}) is the rate at which each worker may receive a better from the informal(formal) sector.

The value of employment in the informal sector can be written as

$$
\begin{aligned}
rW_i(w) &= w + \gamma + \delta_i \left[W_n - W_i(w)\right] \\
&\quad + \lambda_{ii} \int \max\left\{x - W_i(w), 0\right\} dF_i(x) \\
&\quad + \lambda_{if} \int \max\left\{x - W_i(w), 0\right\} dF_f(x)
\end{aligned}
$$

where γ is the relative value of health insurance outside the formal sector.

Finally, the value of unemployment can be written as

$$
\begin{aligned}
rW_n &= b + \gamma + \lambda_{nf} \int \max\left\{x - W_n, 0\right\} dF_f(x) \\
&\quad + \lambda_{ni} \int \max\left\{x - W_n, 0\right\} dF_i(x)
\end{aligned}
$$

where b is the value of leisure and γ is the relative value of health insurance. λ_{ni} (λ_{nf}) is the rate at which each worker may receive a better from the informal(formal) sector.

Then, the worker's decision is characterized by a reservation value strategy, such that a job offer from either sector has to be equal or above their current value.

6.1 Workers' Flow Conditions

In steady state, the stocks of workers in each sector remain stable. The flows of workers earning up to W entering and leaving each sector should thus equate:

- Formal sector

$$
\begin{aligned}
&\left[\delta_f + \lambda_{ff}\overline{F}_f(W)\right] m_f G_f(W) + \lambda_{fi} m_f \int_{W_n}^{W} \overline{F}_i(x) dG_f(x) \\
&= \lambda_{nf} m_n F_f(W) + \lambda_{if} m_i \int_{W_n}^{W} \left[F_f(W) - F_f(x)\right] dG_i(x)
\end{aligned}
$$

- Informal sector

$$
\begin{aligned}
&\left[\delta_i + \lambda_{ii}\overline{F}_i(W)\right] m_i G_i(W) + \lambda_{if} m_i \int_{W_n}^{W} \overline{F}_f(x) dG_i(x) \\
&= \lambda_{ni} m_n F_i(W) + \lambda_{fi} m_f \int_{W_n}^{W} \left[F_i(W) - F_i(x)\right] dG_f(x)
\end{aligned}
$$

Given the transition rates and the job offers distributions, we set $W = \overline{W}$, the mass of workers equal to one, and solve the above system for the stocks of workers in the steady state: m_f,m_i, and m_n. In the expressions above G_f and G_i are the distributions of accepted contracts in the formal and informal sectors. These expressions also show an equilibrium relationship between the distribution of accepted (G) and offered contract (F) values.

6.2 Firms

Following Bontemps et al (2000), firms are heterogenous (have productivity $p \sim \Gamma^s(p)$ in sector $s = f, i$) and choose contract values that maximize profits. The profits in the *steady-state* are given by:

$$\pi_f(p) = \max_{W \geq W_n} \left[p - (1 + \tau + \delta_f s) w_f(W) - \phi\right] \ell_f(W)$$
$$\pi_i(p) = \max_{W \geq W_n} \left[p - w_i(W)\right] \ell_i(W)$$

where τ is payroll tax (cost to provide social health insurance); s is the severance rate and ϕ is the cost to provide private health insurance.

6.3 Equilibrium Contract Value Distributions and Wages

The labor force size is derived from the flow conditions, with the mass of workers normalized to 1 and n_f and n_i are the fraction of formal and informal sector firms, respectively:

$$\ell_f(W) = \frac{1}{n_f} \frac{\lambda_{nf} m_n + \lambda_{ff} m_f G_f(W) + \lambda_{if} m_i G_i(W)}{\delta_f + \lambda_{ff} \overline{F}_f(W) + \lambda_{fi} \overline{F}_i(W)}$$
$$\ell_i(W) = \frac{1}{n_i} \frac{\lambda_{ni} m_n + \lambda_{ii} m_i G_i(W) + \lambda_{fi} m_f G_f(W)}{\delta_i + \lambda_{ii} \overline{F}_i(W) + \lambda_{if} \overline{F}_f(W)}.$$

That is, the normalized firm size in steady state is obtained by $(1/n)\times$ "the ratio of total hiring over total job destruction rate".

The equilibrium distributions G_f and G_i are also obtained from the flow equations. Their solution can be obtained either numerically or as in Meghir, Narita and Robin (2014), who provide analytical solution for G as function of F distributions and the transition parameters.

Equilibrium wages are obtained from the workers equations, given the offer (F) distributions and the transition parameters.

6.4 Other parameters

6.4.1 Government

The government collects taxes from the formal sector (income tax ρ; payroll tax τ) and it finances Seguro Popular for the uninsured (informal and nonemployed).

6.4.2 The value of leisure and Taxes

The value of leisure b is obtained by setting the value of nonemployment equal to the minimum expected value in the informal sector, $min(W_i) = W_n$. This is a reasonable assumption given that the lowest wages in the economy are in the informal sector and the minimum wage is not imposed in the informal sector. Finally, we assume that $(min(W_f) = (min(W_i) = W_n$ and we are able to identify γ.

Finally, as for other parameters: $\{\text{r},\tau\rho, s, \phi\}$ are the interest rate per quarter, federal payroll, income, and severance taxes and ϕ is estimated using the average cost of private basic health insurance.

6.5 Estimation

We solve for $\Theta = \{F_f, F_i, \delta_f, \delta_i, \lambda_{nf}, \lambda_{ni}, \lambda_{ii}, \lambda_{ff}, \lambda_{if}, \lambda_{fi}, b, \gamma\}$ as follows:

1. Assume function form and support for the F_f and F_i distributions

$$F_j(x) \quad = \quad \text{Beta}\left(\frac{x - \underline{W}_j}{\overline{W}_j - \underline{W}_j}; \alpha_j, \beta_j\right), \quad \underline{W}_j \leq x \leq \overline{W}_j, j = f, i$$

2. Given α_f, α_i, β_f, β_i, the minimum support of F_f and maximum support of F_i , $\overline{w}_f$ and $\underline{w}_i$ from data, the assumptions $\underline{W}_i = \underline{W}_f = W_n$, we obtain $F_f(W), F_i(W), W_n$, γ , b

3. With the value contracts, and F_f and F_i distributions, obtain the model equilibrium G_f and G_i distributions

4. Estimate the stocks m_n, m_i, m_f

5. Estimate the transition rates using method of moments

6. Re-start process for many F_f and F_i , and choose the pair that solve:

$$\min \sum_{s=f,i} \sum_{k=1}^{K} \left(G_s(W_k) - \tilde{G}_s(W(w_k)) \right)^2$$

- for K values chosen on a discrete grid and $\tilde{G}_s$ being the distribution of wages in the data

Transition Parameters Given F_f and F_i , estimate the transition rates using method of moments. We follow the individual from the first interview until *one* quarter ahead: we obtain the average transition from the data $\widetilde{D}_{ss'};\ s, s' = n, f, i.$ The durations are exponentially distributed, thus we construct the transitions from the model $D_{ss'}; s, s' = n, f, i$ as follows:

- Transitions to nonemployment:

$$D_{jn} = \int_{\underline{W}_j}^{\overline{W}_j} \frac{\lambda_{jn}}{d_j(x)} (1 - e^{-d_j(x) \times 1}) dG_j(x),\ j = f, i$$

with $d_j(W) = \delta_j + \lambda_{jf} \overline{F}_f(W) + \lambda_{ji} \overline{F}_i(W),\ j = f, i$

- Transitions out-of nonemployment:

$$D_{nj} = \frac{\lambda_{nj}}{\lambda_{nf} + \lambda_{ni}} (1 - e^{-(\lambda_{nf} + \lambda_{ni}) \times 1}),\ j = f, i$$

- Transitions job-to-job:

$$D_{jj'} = \int_{\underline{W}_j}^{\overline{W}_j} \frac{\lambda_{jj'} \overline{F}_{j'}(x)}{d_j(x)} (1 - e^{-d_j(x) \times 1}) dG_j(x),\ j = f, i$$

- We have a just-identified system of 8 non-linear equations for 8 parameters ($\lambda' s$). We solve for the transition parameters using fixed point solution.

7 Estimation Results

Our model assumes that individuals are identical in terms of productivity and that all heterogeneity comes from the firm side. To make this assumption more realistic we estimate the model separately by groups of individuals defined by region (there are 8 regions in Mexico), age (20-39 and 40-59), education (below and above primary school), family composition (with/out children 14 years old or under) and gender.

For the moment, we present estimates for low education individuals (that is, individuals that at most completed primary education, which represent about half of Mexican population) and four out of the eight regions in the country. These four regions are: (1) The North West region is composed by Baja California, Baja California Sur, Chihuahua, Durango, Sinaloa, and Sonora states; (2) South Central region by Distrito Federal, Mexico, and Morelos; (3) South East by Campeche, Quintana Roo, Tabasco, and Yucatan; finally (4) the South West comprises the regions of Chiapas, Guerrero, and Oaxaca. The South Central and North West regions are more developed than the South West and South East.

In this version of the paper, our estimates for the structural model use data from the labor market survey the period 2000 to 2003.

7.1 The Model Fit

Tables 6-9 compare moments from the model and the data. The model fits transitions remarkably well. The distribution of wages is also reasonably replicated for the **median**, the 25th and the 75th percentiles, although the fit is not as good in the tails. The stocks of formal employment, informal employment and unemployment fit remarkably well for females. In other cases we tend to underestimate a bit formal employment with more people being allocated to the informal sector relative to the data. This is preliminary. We aim to improve the fit of the stocks by gathering information that allows us to construct the intra-sector job-job transitions as well as using the stocks in the data in the convergence criterion of our estimation algorithm. Nevertheless, the model seems to be able to replicate other key patterns in the data with relatively few parameters.

Table 6: Model Fit - Males, Households without children 14 years old or less.

	Northwest		South Central				South East		South West			
	Ages 40-59		Ages 20-39		Ages 40-59		Ages 40-59		Ages 20-39		Ages 40-59	
	data	model	data	model	data	model	data	model	data	model	data	model
m_f	0.305	0.240	0.251	0.114	0.245	0.160	0.228	0.158	0.155	0.083	0.159	0.104
m_i	0.552	0.649	0.675	0.848	0.637	0.744	0.672	0.774	0.772	0.889	0.751	0.818
n	0.144	0.111	0.074	0.038	0.117	0.096	0.100	0.069	0.073	0.028	0.090	0.078
Transition probabilities												
D_{nf}	0.085	0.085	0.056	0.056	0.036	0.036	0.057	0.057	0.055	0.055	0.024	0.024
D_{ni}	0.387	0.387	0.695	0.695	0.441	0.441	0.434	0.434	0.743	0.743	0.540	0.540
D_{fn}	0.041	0.041	0.041	0.041	0.025	0.025	0.029	0.029	0.029	0.029	0.027	0.027
D_{fi}	0.155	0.155	0.225	0.225	0.162	0.162	0.148	0.148	0.224	0.224	0.165	0.165
D_{in}	0.090	0.090	0.062	0.062	0.080	0.080	0.056	0.056	0.049	0.049	0.077	0.077
D_{if}	0.085	0.085	0.057	0.057	0.045	0.045	0.046	0.046	0.030	0.030	0.027	0.027
Formal earnings												
1st decile	8.97	8.20	8.83	8.72	8.79	8.71	8.68		8.66	8.38	8.68	8.48
1st quartile	9.25	9.37	9.07	9.10	9.09	9.08	8.95	8.87	8.91	9.02	8.93	8.89
median	9.54	9.75	9.34	9.35	9.36	9.36	9.27	9.30	9.16	9.32	9.26	9.30
3rd quartile	9.82	9.88	9.61	9.52	9.66	9.65	9.63	9.66	9.47	9.46	9.58	9.58
9th decile	10.16	10.10	9.88	9.65	9.92	9.86	10.00	9.76	9.74	9.60	9.87	9.85
mean	9.71	9.60	9.45	8.97	9.52	9.26	9.51	9.15	9.29	9.19	9.43	9.27
Informal earnings												
1st decile	8.55	8.78	8.65	9.09	8.38	8.65	7.76	7.85	7.46	7.18	7.05	7.33
1st quartile	9.07	9.27	8.94	9.17	8.84	8.96	8.43	8.81	8.49	7.78	7.98	8.24
median	9.46	9.61	9.23	9.26	9.17	9.23	9.04	9.13	8.96	8.22	8.92	8.85
3rd quartile	9.98	9.89	9.52	9.34	9.56	9.47	9.53	9.41	9.37	8.59	9.42	9.32
9th decile	10.57	10.14	9.82	9.43	9.96	9.69	10.03	9.65	9.73	8.75	9.85	9.32
mean	9.87	9.68	9.40	9.48	9.44	9.34	9.38	9.19	9.13	8.31	9.22	8.97

Note: Transitions and wages are quarterly.

Table 7: Model Fit - Males, Households with children 14 years old or less.

	South Central				South East		South West			
	Ages 20-39		Ages 40-59		Ages 40-59		Ages 20-39		Ages 40-59	
	data	model	data	model	data	model	data	model	data	model
m_f	0.222	0.097	0.215	0.143	0.219	0.130	0.125	0.069	0.115	0.073
m_i	0.735	0.881	0.712	0.808	0.739	0.838	0.839	0.912	0.830	0.888
n	0.043	0.021	0.073	0.049	0.042	0.033	0.037	0.019	0.054	0.039
Transition probabilities										
D_{nf}	0.084	0.084	0.046	0.046	0.070	0.070	0.041	0.041	0.022	0.022
D_{ni}	0.677	0.677	0.607	0.607	0.534	0.534	0.739	0.739	0.654	0.654
D_{fn}	0.021	0.021	0.023	0.023	0.017	0.017	0.019	0.019	0.025	0.025
D_{fi}	0.207	0.207	0.174	0.174	0.162	0.162	0.243	0.243	0.193	0.193
D_{in}	0.042	0.042	0.063	0.063	0.037	0.037	0.034	0.034	0.049	0.049
D_{if}	0.060	0.060	0.044	0.044	0.040	0.040	0.032	0.032	0.021	0.021
Formal earnings										
1st decile	8.80	8.63	8.89	8.54	8.76	7.07	8.70	7.95	8.80	8.04
1st quartile	9.03	9.14	9.11	9.00	8.99	8.89	8.95	8.88	9.05	8.91
median	9.30	9.31	9.37	9.43	9.31	9.37	9.19	9.28	9.37	9.42
3rd quartile	9.53	9.46	9.63	9.69	9.71	9.74	9.52	9.55	9.69	9.69
9th decile	9.76	9.56	9.92	9.88	10.07	9.98	9.79	9.72	10.01	9.88
mean	9.37	8.96	9.52	9.25	9.58	9.25	9.35	9.07	9.52	9.31
Informal earnings										
1st decile	8.54	9.08	8.41	8.75	7.45	9.06	6.96	8.49	6.97	7.30
1st quartile	8.87	9.08	8.88	8.97	8.25	9.27	7.91	8.66	7.71	8.05
median	9.20	9.16	9.23	9.17	8.91	9.45	8.80	8.81	8.75	8.58
3rd quartile	9.48	9.26	9.59	9.35	9.50	9.62	9.31	8.96	9.41	9.00
9th decile	9.76	9.26	9.88	9.53	10.01	9.79	9.69	9.10	9.86	9.18
mean	9.34	9.53	9.40	9.33	9.34	9.54	9.02	8.95	9.17	8.66

Note: Transitions and wages are quarterly.

Table 8: Model Fit - Females, Households without children 14 years old or less.

	Northwest				South Central		South East				South West			
	Ages 20-39		Ages 40-59		Ages 40-59		Ages 20-39		Ages 40-59		Ages 20-39		Ages 40-59	
	data	model	data	model	data	model	data	model	data	model	data	model	data	model
mf	0.265	0.140	0.106	0.138	0.073	0.060	0.119	0.061	0.049	0.047	0.081	0.028	0.035	0.028
mi	0.232	0.202	0.238	0.203	0.280	0.310	0.335	0.313	0.305	0.340	0.387	0.343	0.374	0.404
n	0.504	0.658	0.657	0.659	0.652	0.630	0.546	0.626	0.641	0.612	0.531	0.630	0.591	0.568
Transition probabilities														
Dnf	0.032	0.032	0.032	0.032	0.008	0.008	0.008	0.008	0.006	0.006	0.004	0.004	0.004	0.004
Dni	0.111	0.111	0.111	0.111	0.145	0.145	0.144	0.144	0.153	0.153	0.168	0.168	0.185	0.185
Dfn	0.152	0.152	0.152	0.152	0.079	0.079	0.096	0.096	0.075	0.075	0.081	0.081	0.078	0.078
Dfi	0.100	0.100	0.100	0.100	0.137	0.137	0.137	0.137	0.149	0.149	0.229	0.229	0.165	0.165
Din	0.306	0.306	0.306	0.306	0.271	0.271	0.263	0.263	0.257	0.257	0.286	0.286	0.250	0.250
Dif	0.074	0.074	0.074	0.074	0.027	0.027	0.030	0.030	0.021	0.021	0.019	0.019	0.012	0.012
Formal earnings														
1st decile	8.912	9.295	8.912	9.420	8.647	8.444	8.573	9.043	8.505	8.475	8.480	8.781	8.516	9.014
1st quartile	9.103	9.303	9.103	9.423	8.863	8.697	8.813	9.055	8.722	8.703	8.644	8.800	8.762	9.034
median	9.320	9.323	9.320	9.427	9.165	8.966	9.078	9.087	9.026	9.004	8.870	8.842	9.063	9.060
3rd quartile	9.565	9.345	9.565	9.433	9.424	9.104	9.371	9.124	9.373	9.169	9.116	8.910	9.364	9.103
9th decile	9.755	9.370	9.755	9.447	9.640	9.288	9.663	9.163	9.677	9.379	9.403	8.955	9.637	9.132
mean	9.408	9.316	9.408	9.352	9.276	8.935	9.196	9.046	9.231	8.987	8.979	8.848	9.165	9.057
Informal earnings														
1st decile	8.446	7.383	8.446	7.394	7.644	6.849	7.319	6.583	7.127	6.605	7.469	6.645	7.174	5.904
1st quartile	8.765	7.490	8.765	7.479	8.205	7.558	8.212	6.583	7.869	7.615	8.152	6.977	7.822	6.442
median	9.163	7.628	9.163	7.577	8.767	8.146	8.736	7.423	8.487	8.306	8.608	7.339	8.411	6.951
3rd quartile	9.522	7.779	9.522	7.694	9.160	8.617	9.156	7.769	9.043	8.823	9.018	7.687	8.941	7.391
9th decile	9.920	7.938	9.920	7.826	9.553	9.005	9.576	8.074	9.537	9.238	9.427	8.007	9.354	7.766
mean	9.398	7.675	9.398	7.638	8.985	8.129	8.929	7.439	8.882	8.421	8.817	7.535	8.724	7.083

Note: Transitions and wages are quarterly.

Table 9: Model Fit - Females, Households with children 14 years old or less.

	Northwest				South Central				South East				South West			
	Ages 20-39		Ages 40-59		Ages 20-39		Ages 40-59		Ages 20-39		Ages 40-59		Ages 20-39		Ages 40-59	
	data	model	data	model	data	model	data	model	data	model	data	model	data	model	data	model
m_f	0.154	0.130	0.120	0.094	0.046	0.065	0.052	0.043	0.047	0.061	0.042	0.040	0.026	0.021	0.025	0.026
m_i	0.192	0.189	0.243	0.232	0.277	0.278	0.309	0.304	0.264	0.313	0.335	0.349	0.330	0.350	0.407	0.391
n	0.654	0.681	0.636	0.674	0.677	0.658	0.639	0.653	0.689	0.626	0.624	0.610	0.644	0.629	0.568	0.583
Transition probabilities																
D_{nf}	0.031	0.031	0.016	0.016	0.010	0.010	0.005	0.005	0.009	0.009	0.006	0.006	0.004	0.004	0.004	0.004
D_{ni}	0.107	0.107	0.123	0.123	0.139	0.139	0.153	0.153	0.154	0.154	0.169	0.169	0.174	0.174	0.194	0.194
D_{fn}	0.164	0.164	0.116	0.116	0.094	0.094	0.086	0.086	0.111	0.111	0.086	0.086	0.113	0.113	0.103	0.103
D_{fi}	0.087	0.087	0.103	0.103	0.164	0.164	0.151	0.151	0.121	0.121	0.157	0.157	0.223	0.223	0.126	0.126
D_{in}	0.324	0.324	0.310	0.310	0.296	0.296	0.297	0.297	0.280	0.280	0.275	0.275	0.290	0.290	0.273	0.273
D_{if}	0.063	0.063	0.044	0.044	0.037	0.037	0.022	0.022	0.027	0.027	0.017	0.017	0.015	0.015	0.010	0.010
Formal earnings																
1st decile	8.860	8.546	8.790	8.706	8.633	8.482	8.585	6.903	8.572	3.086	8.452	8.624	8.489	8.631	8.555	8.149
1st quartile	9.054	8.709	9.041	8.820	8.816	8.500	8.820	7.035	8.787	4.684	8.701	8.655	8.728	8.672	8.765	8.212
median	9.296	8.870	9.292	8.928	9.029	8.544	9.055	7.318	9.045	5.408	8.951	8.699	8.968	8.724	9.060	8.333
3rd quartile	9.490	9.026	9.543	9.031	9.211	8.593	9.330	7.588	9.346	6.268	9.294	8.724	9.207	8.782	9.355	8.498
9th decile	9.684	9.181	9.752	9.132	9.454	8.669	9.566	7.829	9.647	6.817	9.606	8.777	9.507	8.870	9.649	8.550
mean	9.385	8.903	9.400	8.942	9.099	8.540	9.178	7.405	9.206	5.897	9.095	8.684	9.069	8.728	9.217	8.349
Informal earnings																
1st decile	7.885	7.133	7.794	6.869	7.624	6.439	7.610	6.838	6.679	6.130	6.533	6.247	6.950	6.201	6.952	5.750
1st quartile	8.447	7.645	8.432	7.365	8.224	6.783	8.117	7.463	7.622	6.813	7.402	6.768	7.671	6.853	7.722	6.345
median	8.907	8.121	8.895	7.838	8.624	7.137	8.624	8.004	8.431	7.365	8.271	7.205	8.337	7.419	8.373	6.894
3rd quartile	9.316	8.524	9.359	8.244	8.973	7.473	9.029	8.462	8.970	7.828	8.873	7.577	8.837	7.890	8.906	7.354
9th decile	9.776	8.867	9.881	8.592	9.323	7.783	9.384	8.848	9.374	8.549	9.407	8.179	9.336	8.283	9.380	7.739
mean	9.211	8.101	9.284	7.870	8.810	7.309	8.858	8.192	8.724	7.700	8.673	7.434	8.679	7.492	8.696	7.025

Note: Transitions and wages are quarterly.

Males get a job more easily from the informal than the formal sector. This is the same for females, however these leave nonemployment at much lower rates than males. Clearly the informal sector offers a relatively quick return to employment. However, except for two groups, from an informal job individuals are less likely to obtain a formal job offer. Individuals in any sector mostly obtain job offers from employment than nonemployment. Higher mobility among men in all directions and lower job destruction rates also reflect lower nonemployment rates as showed in tables 6-9. All these seem an important feature in the Mexican data.

7.2 The Value outside the formal sector and the Value of leisure

The last four columns of Tables 10-11 present the implied utility value of not being in the formal sector. This value arises from the relative dis/utility individuals place on the health insurance that is offered in the informal sector as well as to the nonemployed, after discounting the value of leisure in the last case. It may also reflect the relative offer of other amenities across sectors. We report the value of being outside the formal sector, γ, in currency units and relative to the median wage in the informal sector.

Relative to wages, females value more being outside the formal sector than males, 2-20 times. Males located in poor region also place more value in amenities outside the formal sector. While patterns by age and family composition are less clear, we do find older individuals and households without children 14 or less with a higher value outside the formal sector. Importantly, this parameter is found positive in most groups which is suggestive of compensating differentials towards the uninsured sector. This parameter and the variation across groups is what we will use to fit real data on health infrastructure and risk.

In Tables 10-11 we also present the estimated flow value of leisure in currency units and divided by the median wage in the informal sector. These are negative for most males and positive for half of females groups, so as found in other papers females value leisure more than males probably reflecting the demands of families and home production. Also we found is most cases that the value of leisure is lower in poor than in richer regions, for households with children 14 or less, and for older individuals.

Table 10: Model Parameters - Males.

	δ_f	δ_i	λ_{nf}	λ_{ni}	λ_{fi}	λ_{if}	b	γ_nf	$\frac{b}{median(w_i)}$	$\frac{\gamma\_nf}{median(w_i)}$
					Panel A: Households without children 14 years old or less					
Northwest - Ages 20 to 39										
Northwest - Ages 40 to 59	0.012	0.023	0.029	0.131	0.902	0.092	-2098.0	-669.5	-0.140	-0.045
South Central - Ages 20 to 39	0.019	0.012	0.026	0.322	0.393	0.590	-2303.1	5241.8	-0.220	0.501
South Central - Ages 40 to 59	0.008	0.019	0.012	0.150	0.156	0.111	-6863.9	7950.8	-0.676	0.784
South East - Ages 40 to 59	0.009	0.013	0.020	0.149	0.676	0.047	-6055.7	786.6	-0.654	0.085
South West - Ages 20 to 39	0.009	0.012	0.027	0.372	0.472	0.037	-9871.5	8208.9	-2.656	2.209
South West - Ages 40 to 59	0.008	0.018	0.009	0.199	0.150	0.033	-13379.0	9116.9	-1.926	1.312
					Panel B: Households with children 14 years old or less					
Northwest - Ages 20 to 39										
Northwest - Ages 40 to 59										
South Central - Ages 20 to 39	0.009	0.007	0.040	0.318	0.964	0.688	917.1	3900.0	0.096	0.408
South Central - Ages 40 to 59	0.008	0.014	0.018	0.246	0.214	0.134	-10949.0	8032.8	-1.143	0.838
South East - Ages 40 to 59	0.005	0.008	0.027	0.204	0.538	0.108	-8745.1	2349.8	-0.687	0.185
South West - Ages 20 to 39	0.007	0.007	0.020	0.358	0.529	0.122	-11179.0	8023.0	-1.660	1.192
South West - Ages 40 to 59	0.008	0.012	0.009	0.273	0.298	0.025	-14324.0	9230.4	-2.693	1.736

Table 11: Model Parameters - Females.

	δ_f	δ_i	λ_{nf}	λ_{ni}	λ_{fi}	λ_{if}	b	γ_nf	$\frac{b}{median(w_i)}$	$\frac{\gamma\_nf}{median(w_i)}$
Panel A: Households without children 14 years old or less										
Northwest - Ages 20 to 39	0.045	0.095	0.009	0.030	0.090	0.057	1573.7	9781.5	0.766	4.760
Northwest - Ages 40 to 59	0.048	0.092	0.009	0.030	0.050	0.160	1567.5	11380.0	0.803	5.828
South Central - Ages 40 to 59	0.022	0.080	0.002	0.039	0.211	0.016	128.6	4947.2	0.037	1.434
South East - Ages 20 to 39	0.029	0.076	0.002	0.039	0.066	0.053	54.5	8741.3	0.033	5.220
South East - Ages 40 to 59	0.022	0.075	0.002	0.042	0.114	0.018	-799.0	6723.5	-0.197	1.661
South West - Ages 20 to 39	0.025	0.085	0.001	0.046	0.123	0.026	305.2	6781.1	0.198	4.406
South West - Ages 40 to 59	0.023	0.072	0.001	0.051	0.085	0.014	-99.0	8648.3	-0.095	8.281
Panel B: Households with children 14 years old or less										
Northwest - Ages 20 to 39	0.047	0.102	0.008	0.029	0.103	0.038	1060.5	4304.0	0.315	1.280
Northwest - Ages 40 to 59	0.033	0.095	0.004	0.033	0.125	0.027	661.5	5619.5	0.261	2.217
South Central - Ages 20 to 39	0.028	0.089	0.003	0.038	0.092	0.050	387.5	4753.8	0.308	3.780
South Central - Ages 40 to 59	0.025	0.089	0.001	0.042	0.064	0.050	-127.8	1391.9	-0.043	0.465
South East - Ages 20 to 39	0.034	0.082	0.003	0.042	0.048	0.086	-203.8	224.1	-0.129	0.142
South East - Ages 40 to 59	0.025	0.081	0.002	0.046	0.067	0.033	-267.0	6127.4	-0.198	4.551
South West - Ages 20 to 39	0.035	0.086	0.001	0.048	0.111	0.023	-151.1	6477.2	-0.091	3.884
South West - Ages 40 to 59	0.030	0.080	0.001	0.054	0.125	0.006	-130.5	3642.2	-0.132	3.692

7.3 Fitting γ to data on health amenities and risk

After having estimated the model for different groups of the population by region, age, education, family composition and gender we fit the estimated γ on several variables characterizing the local supply of health services. For example, the distance between the place of residence of households and the clinics in either the health sector that serves families not covered by Social Security (the *Ministry of Health*) and the Social Security sectors (IMSS) and doctors per capita in each sector.

We control for fixed effects for region, age group, education, family composition and gender, which aim to capture group-specific time invariant variation in γ, which are difficult to change by policy. Then, we we estimate the following regression model

$$\widehat{\gamma_{argeht}} = \alpha + \beta_t X^0_{argeht} + a + r + g + e + h + t + \varepsilon_{argeht} \tag{2}$$

where X^0_{argeht} (*for now*) includes the average distance between the place of residence of families and clinics in each sector, the average doctors per potential user in each sector and fixed effects for region (r), age (a), education (e), gender (g), family composition (h) and time (t). Preliminary results for the estimation of equation 2 are presented in table 12. These results are based on 45 samples of region-age-education-gender-family composition. They show that men value relatively less than women the amenities of the informal sector or non-employment.

Table 12: Willingness to pay for informality (pre-reform).

	(1)	(2)	(3)
Male	-1,910.212	-2,170.606	-3,429.253*
	(1,340.531)	(1,365.262)	(1,928.058)
1[40¡Age¡65]	-929.489	-1,014.208	-1,927.514
	(1,281.360)	(1,312.396)	(1,643.473)
With young children	-805.637	-777.177	-799.754
	(1,274.366)	(1,306.084)	(1,308.697)
Docs in SSA/1000 eligible		-71.590	-73.373
		(50.927)	(51.056)
Clinics in SSA/1000 eligible		-10.261	-12.794
		(45.453)	(45.618)
1[40¡Age¡65]Xage			2,537.069
			(2,739.180)
Observations	45	45	45
R-squared	0.186	0.122	0.142
Region FE	X		

Then, we can perform the following decomposition once the model is estimated for 2 periods (period 0 before the reform and period 1 post-reform):

$$\widehat{\gamma_{argeh1}} - \widehat{\gamma_{argeh0}} = \beta_0(X^1 - X^0) + (\beta_1 - \beta_0)X^1 \quad (3)$$

where $\beta_0(X^1 - X^0)$ is the change in the informal sector and non-employment amenities between periods $(X^1 - X^0)$, weighted by the pre-reform relative weight of each amenity, β_0. $(\beta_1 - \beta_0)X^1$ is the change in the relative weight of each amenity in the informal sector and non-employment, which can be associated to the reform.

8 Preliminary Conclusions

In this paper we have developed a structural model of the labor market to obtain equilibrium effects of the non-contributory health insurance program *Seguro Popular (SP)* on the Mexican workforce composition, wages and welfare. We have estimated the model for the *pre-reform economy* (2000-2003), i.e. before the introduction of SP, for different subsamples defined by region, age, family composition, education and gender – all groups likely to have different valuations of health care benefits. From the estimated parameters of the model, we have recovered the relative valuation of being outside the formal sector. Our preliminary results show that, in general, females, older individuals and households without young children place a higher value on amenities present in the informal sector as well as in non-employment.

The next steps will be to relate the marginal valuation of being outside the formal sector to the presence of health infrastructure, risk and other amenities associated present in the informal and formal sectors. We aim to answer two main questions: (i) To what extent access to health care is a job amenity valued by those in the informal sector and nonemployment? (ii) How much of the increase in informality in Mexico since 2002 can be attributed to the introduction of SP? We will then use the model to simulate counterfactual scenarios of employment and labor formality under alternative designs of the packages of benefits included in SP. The model is also being currently extended from an individual to a household search model to incorporate more realistically key features of SP. With our results we aim to shed light on the mechanisms behind the labor market impacts of health reforms that extend coverage to individuals in the informal sector or out of the labor force.

References

[1] Albrecht, James, Lucas Navarro, and Susan Vroman. 2009. "The Effects of Labour Market Policies in an Economy with an Informal Sector." The Economic Journal, 119(539):

11051129.

[2] Aterido, Reyes, Mary Hallward-Driemeier and Carmen Pags, 2011, "Does Expanding Health Insurance Beyond Formal-Sector Workers Encourage Informality? Measuring the Impact of Mexico's Seguro Popular", IZA DP No. 5996, September 2011.

[3] Azuara, Oliver and Ioana Marinescu, 2011, "Informality and the Expansion of Social Protection Programs: The Case of Mexico", Mimeo.

[4] Barros, Ricardo, 2010, "Wealthier but not much Healthier: Effects of a Health Insurance Program for the Poor in Mexico", Mimeo.

[5] Bosch, Mariano and Campos-Vzquez, Raymundo M., forthcoming, "The Trade-offs of Welfare Policies in Labor Markets with Informal Jobs: The Case of the Seguro Popular Program in Mexico", American Economic Journal: Economic Policy.

[6] Bosch, Mariano and Maloney, William F., 2008. "Cyclical Movements in Unemployment and Informality in Developing Countries," IZA Discussion Papers 3514, Institute for the Study of Labor (IZA).

[7] Burdett, Kenneth, and Dale T. Mortensen. 1998. "Wage Differentials, Employer Size, and Unemployment." International Economic Review, 39(2): 257-273.

[8] Centro de Estudios Sociales y Opinion Publica, CESOP, 2005, *Programa Seguro Popular*, Camara de Diputados, Estados Unidos Mexicanos, Febrero 2005.

[9] Finkelstein, Amy and Taubman, Sarah and Wright, Bill and Newhouse, Joseph P. and Allen, Heidi and Bernstein, Mira and Gruber, Jonathan and Baicker, Katherine, 2013, "The Oregon Health Insurance Experiment: Evidence from the First Year", Quarterly Journal of Economics.

[10] Frenk, Julio, 2011, "La Reforma de Salud en Mexico", Mexico DF: Fundacion Mexicana para la Salud, 15.

[11] Frenk, Julio, Eduardo Gonzlez-Pier, Octavio Gmez-Dants, Miguel Lezana, Felicia Knaul, 2006, "Comprehensive reform to improve health system performance in Mexico", *The Lancet*, Vol. 368, October 28 2006, 152434.

[12] Gallardo-Garcia, 2006, "Health Insurance and Pregnancy Outcomes: An Analysis of Fertility, Prenatal Care and Employment in Mexico", Ph.D. thesis at University of Pennsylvania.

[13] King, Gary, Emmanuela Gakidou, Kosuke Imai, Jason Lakin, Ryan T Moore, Clayton Nall, Nirmala Ravishankar, Manett Vargas, Martha Mara Tllez-Rojo, Juan Eugenio Hernndez vila, Mauricio Hernndez vila, and Hctor Hernndez Llamas, 2009, "Public policy for the poor? A randomized assessment of the Mexican universal health insurance program", *The Lancet*, 273, 1447-1454.

[14] Knox, Melissa, 2008, "Health Insurance for All: An Evaluation of Mexico's Seguro Popular Program", Mimeo.

[15] Levy, H. and David Meltzer, 2008, "The impact of health insurance on health", *Annual Review of Public Health*, 29: 399-409.

[16] Meghir, Costas, Renata Narita and Jean Marc RobinWages and Informality in Developing Countries, The American Economic Review, forthcoming.

[17] Miller, Grant, Diana Pinto and Marcos Vera-Hernandez, 2013, "Risk Protection, Service Use, and Health Outcomes Under Colombia's Health Insurance Program for the Poor", American Economic Journal: Applied, forthcoming.

[18] Muoz, Onofre, 2012, "Propuesta de un Sistema Nacional de Servicios de Salud. Componente de Salud de una propuesta de Seguridad Social Universal", CONEVAL. `http://encuestas.insp.mx/calidad/doctos/LtUvjmSm2Z1UNZVyxY9XZh9G7UCXlQ.pdf`

[19] Taubman, Sarah L., Heidi L. Allen, Bill J. Wright, Katherine Baicker, Amy N. Finkelstein, "Medicaid Increases Emergency-Department Use: Evidence from Oregon's Health Insurance Experiment", Science 17 January 2014: Vol. 343, no. 6168, pp. 263-268.

A Appendix: Tables

Table A.1: Distribution of SP families per health center and general hospital

	(1) Mean	(2) SD	(3) Percentile 25	(4) Percentile 75	(5) Percentile 95
Year		Panel A: Number of SP families per general hospital			
2005	10,078	11,865	2,056	14,270	29,555
2006	12,607	16,313	2,635	16,380	40,398
2007	15,572	19,233	3,428	19,116	50,487
2008	18,000	21,700	4,557	22,952	56,946
2009	19,682	24,658	4,312	25,449	71,126
2010	25,164	36,425	2,831	29,343	87,307
		Panel B: Number of SP families per health center			
2005	530	1,168	69	523	2,023
2006	551	1,182	54	544	2,188
2007	535	1,199	28	532	2,113
2008	651	1,306	83	669	2,536
2009	728	1,449	112	737	2,826
2010	1,036	2,082	197	991	4,088

Note: Selected moments from the distribution of the number of families allocated to each health center and general hospital by December 31 of each year between 2005 and 2010 from the *Padron*.

Table A.2: Number of municipalities implementing SP per year under different definitions of rollout.

Definition	2 families		5 families		10 families	
	N	Percent	N	Percent	N	Percent
2002	306	12.47	257	10.49	241	9.86
2003	183	7.46	179	7.3	172	7.04
2004	421	17.16	403	16.44	403	16.5
2005	632	25.76	628	25.62	625	25.58
2006	529	21.57	507	20.69	494	20.22
2007	368	15	425	17.34	425	17.4
2008	13	0.53	39	1.59	59	2.42
2009	1	0.04	9	0.37	14	0.57
2010			4	0.16	10	0.41
Total	2,453	100	2,451	100	2,443	100

Note: Using the register of families enrolled in SP, we consider that a municipality has direct access to SP when the number of families affiliated to the program is at least 10; our results are not sensitive to this definition and this table presents the number of municipalities that implemented the program in each year under three possible definitions: least 2, 5 or 10 families enrolled per municipality.