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Labor informality and the incentive effects of social security: Evidence from a health reform in Uruguay

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Comments welcome

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Abstract: This paper studies the incentive effects of social security benefits on labor market informality following a policy reform in Uruguay. The reform extended health benefits to dependent children of private sector salaried workers, and thus altered the incentive structure of holding formal jobs within the household. The identification strategy of the reform's effects relies on a comparison between workers with children (affected by the reform) and those without children (unaffected by the reform). Difference in differences estimates indicate a substantial effect of this expansion of coverage on informality rates, which fell significantly by about 1.3 percentage points (a 5 percent change) among workers in the treatment group with respect to those in the control group. The evidence also indicates that individuals within households jointly optimized their allocation of labor to the formal and informal sector. Workers responded to the increased incentives for only one member of the household to work in the formal sector. These findings provide evidence of the relevant and substantial incentive effects of social security benefits on the allocation of employment.

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1 Introduction

Uruguay has one of the oldest and most developed contribution-based social security systems in Latin America, with the highest coverage among the cluster of countries in the region with relatively low levels of labor informality (Gasparini and Tornarolli, 2009). The system is based on employer and employee contributions from formal jobs, and provides the covered workforce with a bundle of benefits, including health coverage, and pensions among others. High coverage rates and a series of recent reforms make the Uruguayan system an interesting case study of the incentive effects of social security benefits, and their impact on individual behavior and labor market outcomes.

The analysis presented here focuses on the recent extension of health coverage to the dependants of formal workers in Uruguay as part of a 2008 policy reform. The reform provides a policy experiment setting to study the presence and quantitative relevance of the incentives of social security on labor market formality. This study's main outcome of interest is thus the a worker's decision to operate formally or informally (i.e., to be registered and contribute to the social security system – or not).

A longstanding literature exists on social security benefits, their welfare effects and their labor market outcomes in developed countries (see Summers, 1989, Gruber and Poterba, 1996, and Moffitt, 2002, among many others). A growing body of work discusses these questions in the context of developing countries, where the presence of large proportions of uncovered workers and the simultaneous existence of partial contributory systems, universal and means-tested benefits result in complex incentive structures. These studies concentrate on the source of the incentive effects (Fields, 2005, 2009; Galiani and Weinschelbaum, 2007), on their policy implications (Levy, 2008), and on the degree of employee choice and bargaining power with respect to the determination of its formality status (Perry et al., 2007).

This paper contributes to the literature that analyzes specific policy changes to assess the presence and the quantitative magnitude of the incentive effects introduced by social security systems. Recent examples include analyses of the effects of Mexico's *Programa de Servicios Médicos y Medicamentos Gratuitos* (PSMMG) and *Seguro Popular*, studied by Juárez (2009) and Bosch and Campos-Vázquez (2010), respectively, which introduced health benefits on a non-contributory basis. The main contribution of this research is to study the impact of changes in the bundle of

mandated contributory benefits, and to verify their significant effects on formality choices at the individual and the joint household level. Studies of this type will provide evidence on the structure of labor markets in developing countries, and can inform future social security reforms, especially in terms of the interaction between contributory and non-contributory benefits and labor market decisions.

Since 2005, the Uruguayan government has implemented several policies to extend the coverage of the social security system, including a health insurance reform which extended healthcare coverage to the dependent children of workers registered with the social security. The only requirement to be incorporated into the system is that eligible children must be under 18 years of age. According to estimates from the Ministry of Public Health, roughly 137.000 previously uncovered children enrolled in the NHS during the first semester of 2008, representing a 21 percentage points increase in coverage for children in the relevant age group. As stipulated by the reform, workers and their dependants lose their NHS mandated benefits if the worker stops paying contributions and becomes unregistered (informal).

This health insurance reform (HR) has potential effects on the incentives of workers to participate in the labor market as formal workers. In particular, the decision to contribute to social security depends on the employer and (at least in part) on the worker's response to policy incentives. The extension of healthcare benefits to registered workers' children increases *prima facie* the incentive to become a formal worker if the valuation of the net benefit is greater than the cost of the contribution to the social security system. Such a reform may also generate changes in intra-household labor arrangements within the household, since health coverage for children only requires one adult to be a formal employee – the incentive will be greater for nuclear households where both adults operate informally, while for other types of household the decision depends on the valuation of additional social security benefits.

The HR offers an interesting opportunity to better understand the social security incentives and quantitatively measure their effects. The identification strategy exploits the exogeneity of the extension of healthcare coverage to workers' dependants due to the HR. This policy experiment setup exploits household survey data from repeated cross sections of Uruguay's *Encuesta Continua de Hogares* (ECH) from 2001 to 2009. The estimation relies on a difference in difference methodology to identify and estimate the reform's causal effect. The treatment group consists of private sector

salaried workers with at least one child younger than 18, which were covered by the extension, while adult workers without children in the same sector constitute the control group.

The results indicate that the health reform induced workers in the treatment group to decrease their informality levels on average by about 1.3 percentage points. In terms of the pre-reform period average, this represents a 5 percent decrease in the probability that a private sector salaried worker would hold a job with no associated contributions to the social security system. These results are compatible with theoretical predictions, since extending benefits should increase worker incentives to contribute to the social security system. Moreover, informality levels dropped significantly for females, older workers, employees with medium and advanced levels of education, and for workers in small firms. Considering the household as unit of observation, the results are consistent with the predicted effects for intra-household formality arrangements as a response to the health reform. The estimates indicate a decrease in the likelihood of informal employment for workers with children who are married to spouses in the informal sector. In addition, the results suggest a significant decrease in the probability that both spouses in a household would not contribute to the social security system after the policy reform. These findings are supported by a series of robustness checks.

The rest of the paper is organized as follows. The following section describes the Uruguayan Social Security System and the health care reform of 2008. Section 3 presents the theoretical framework and the proposed empirical strategy. Section 4 describes the data used to obtain the estimates presented in Section 5 and the robustness checks discussed in Section 6. Finally, a brief discussion of the results and conclusions are presented in Section 7.

2 Uruguay's Social Security System and the 2008 Health Reform

2.1 The Social Security System in Uruguay

The system is divided into six governing institutions (known as *cajas*), which oversee a particular aspect of the system.¹ The institution responsible for social security benefits for the workforce is the *Banco de Previsión Social* (BPS), which administers services for registered salaried workers employed in the private sector.²

Uruguayan law requires employers in the private sector to register their employees with BPS. Both employers and employees are required to pay contributions to the BPS amounting to about 32 percent of gross salaries.³ In return, employees receive a package of mandated social benefits, which includes health insurance, unemployment insurance, retirement savings and pensions, and family allowances, among others. Although the total amount of contributions is the sum of different components (mainly health insurance contributions and retirement savings), the social benefits package is indivisible and is usually likened to an overall payroll tax with some benefits (Summers, 1989). Thus, affiliation with BPS grants the worker access to all benefits in the package.

For the purposes of this paper, formal workers are defined as individuals working in firms registered in the BPS. Conversely, informal workers are salaried workers in firms that have not been registered in the BPS by their employers, and thus are not covered by the contributive system. In 2007 (the year previous to policy change under study), approximately 21 percent of salaried workers were not registered with the BPS.

¹ For details about the Uruguayan social security system, one of the oldest in Latin America, see Bucheli (2004) and Ferreira-Coimbra and Forteza (2004).

² The other institutions give coverage to other groups of workers. In particular, two social security institutions cover to the police and armed forces, respectively. The other three institutions administer services for professionals and for workers in the financial sector. Each of these institutions provides different bundles of benefits, usually broader than those provided to BPS beneficiaries.

³ The contribution of salaried employees is calculated using actual nominal salaries, while a notional amount is imputed in the cases of entrepreneurs and self-employed workers.

2.2 The Uruguayan Health System

The health care system in Uruguay has been characterized by a complex and fragmented structure. The main public provider of health is the Ministry of Public Health (*Ministerio de Salud Pública*, MSP), which provides healthcare in the form of free medical services and medicines to low-income sectors.⁴ The main private health provider is a conglomerate known as the Collective Health Care Institutions (*Instituciones de Asistencia Médica Colectiva* - IAMC), which includes a network of private hospitals as well as clinics governed by the “mutual” principle.⁵ Individuals affiliated to the IAMC pay a fixed amount in exchange of a wide range of health services.

As mentioned above, the BPS historically granted health care packages to registered private employees only. Under this contributive scheme, employers and workers paid 5 and 3 percent of salaries, respectively, for a total contribution of 8 percent. A contributing worker is eligible to select an institution from the IAMC network as his/her provider of health care services, paid for by the BPS. Uninsured individuals can choose to pay for their own private health care package, use the public health system (subject to a means test), or remain uncovered.

2.3 The 2008 Health Care Reform

After a long debate, Uruguay’s Parliament approved a bill (number 18.211) to reform the health care component of the social security system. This bill created an integrated National Health System (NHS) geared to extending comprehensive care to all residents and to guarantee equitable and universal coverage through a coordination of the public and private health care sectors. The health reform also intended to unify several fragmented institutions, providers and financing sources into one integrated system. Through the implementation of the health care reform (henceforth referred to as the HR) the government sought to strengthen three areas: health care coverage (focusing on primary care); health management; and health financing.

⁴ The public sector also includes the Public University Hospital (*Hospital de Clínicas*), the Army and Police Health Services (*Hospital Militar* and *Hospital Policial*, respectively), and other similar institutions.

⁵ The private sector also encompasses private insurers and providers of highly specialized medical services, among others.

The pivotal component of the reform was the extension of health care coverage to worker dependants, mainly children and spouses/partners. Due to fiscal restrictions, however, extension of coverage was applied in stages. As previously mentioned, the first stage began in January 2008, when the NHS incorporated workers' children. To qualify, children must be younger than 18 years old. Furthermore, their inclusion is universal and irrespective of previous health coverage arrangements.

The reform also modified substantially the financing of health care services. The new scheme is financed through a public fund called the National Health Fund (*Fondo Nacional de Salud*, FONASA; Law no. 18.131) and managed by the BPS. FONASA receives funds from the mandatory contributions of private and public sector workers, employers in private and public firms, retirees, and the central government. One noteworthy feature of the reform was the increase in almost all contributions: For example, employee contributions grew from 3 to 6 percent of taxable earnings for individuals with children, while contributions for individuals with no children increased from 3 to 4.5 percent. Employer contributions remained unchanged at 5 percent under the new scheme. With these funds the BPS pays the IAMC or public health providers (depending on the user's choice) for health care services and insurance.

The expansion of health care coverage to worker's dependants following the HR affects both public employees and private sector workers registered in the social security system. However, in several cases public workers were already entitled to this extended coverage by the State. Thus, the extension of coverage was most significant for registered private sector workers, who had to pay for their children's health care prior the HR. The new fund, FONASA, assumes this cost under the revised legislation. Even children of formal low-income workers, who previously used public health services, were eligible for private care since FONASA entitles them to choose an IAMC in the private health sector.

3 Analytical Framework and Empirical Strategy

3.1 Potential Incentive Effects

From a choice based perspective, the Uruguayan HR has a series of potential effects on worker incentives and subsequent labor market outcomes. The most direct

behavioral change should apply to the decision to operate formally or informally – that is, as a registered or non-registered worker.⁶ This is especially relevant in cases of workers at the margin of the labor market, and for those at the margin between formality and informality (Maloney, 1999, 2004; Heckman and Pagés, 2004). Moreover, if workers value mandated benefits (especially those immediately available, such as health insurance), as suggested by Levy (2009) and discussed by Summers (1989), then their behavioral labor supply responses must internalize that these are only obtainable through formal employment contributions.

The decision to operate formally or informally should be guided by a cost-benefit analysis in which individuals compare the gains of contributing to the BPS, which consist of the bundle of social security benefits described above, to its cost in terms of increased contributions. Because health insurance is a substantial component of the mandated benefits package in Uruguay, the HR may modify the incentives for workers to operate formally. Some workers might decide to move into formal jobs, or to negotiate different employment conditions with their employers, in order to profit from the expansion of health care coverage to other household members, even with a higher cost in terms of contributions (which increased from 3 to 6 percent of taxable labor earnings for those taking advantage of this option). However, the net impact of HR on formality is ambiguous, and depends on which is the relevant decision unit for the allocation of workers to the formal and the informal sector of the labor market.

From the perspective of an individual worker, the incentive to become a formal employee stems from the benefit of no longer needing to pay directly for a child's health care since it is covered by the social security contribution. These incentives are substantial: For a worker with an average salary, the individual cost of children's affiliation with an IAMC is comparable to the corresponding overall payroll tax for a registered worker,⁷ which provides workers access to the whole bundle of social security benefits (including retirement savings and unemployment insurance). The

⁶ Whether workers have the power to make that decision or if it all comes down to an employer's cost-benefit analysis is a contentious issue in the literature. Instead of opting for one of the two extremes, the discussion in this document assumes that there some degree of influence the worker might have in this decision, and the empirical estimates contribute to assessing this degree.

⁷ In 2008, the average monthly wage for salaried workers with children in the sample group described below is around 630 USD (at 2005 PPP), of which about 130 USD corresponded to social security contributions for formal workers. In the same period the average amount that workers paid to enroll their children in an IAMC would be 60 USD. Since salaried workers have on average 2 young children, the total amount paid for private health care would amount to 120 USD.

effect of the HR from an individual perspective suggests that the reform would potentially increase the incentives of private sector workers to become formal, and this incentive should also result in an increase in the number of children affiliated with the IAMC.

If the decision to operate formally or informally is taken jointly at the household level, the HR may have a differential impact for adults within the household depending on the intra-household allocation of employment relations before the policy change. Galiani and Weinschelbaum (2007) analyze this point from a theoretical perspective, and provide empirical results for Latin America which indicate that secondary workers have a higher probability of operating informally when primary workers are formal. The HR reform in Uruguay implicates that if more than one member of the household was formal before the policy change, the health coverage for children would incur in a double contribution, since the law stipulates that payroll taxes are computed at the individual and not at the household level. In these cases, the HR may induce some household workers to move towards the informal sector, as children would still receive coverage with only one formal worker in the household. When all workers in the household are informal, the HR may induce some of them to operate formally in order to obtain health coverage for children and spouses. Finally, in households who have members in both sectors, the policy might not induce changes in their formality status. The incentives also remain unchanged for households with older or no children – in fact, there may even be incentives to leave the formal sector due to the increase in the payroll tax linked to the health insurance component, which rose from 3 to 4.5 percent for those without children.

The above theoretical considerations provide some predictions with respect to the net effect of the HR policy on labor informality. The decisions ultimately depends on the weight attached to the benefits and costs for employees and employers, in addition to whether or not the formality decision is taken at the individual or household level.

3.2 Identification Strategy and Econometric Modeling

The aim of the estimates presented below is to identify the causal effect of the HR on formality levels, and thus provide evidence on the direction and magnitude of the net incentive effects discussed in the previous section. The empirical strategy

exploits the exogenous extension of health care coverage for workers' children due to the HR in 2008 to isolate the impact of this policy on individual formality choices.⁸ The econometric approach is based on the difference in differences (DD) methodology (Card, 1990; Angrist and Krueger, 1999; Bertrand, Duflo and Mullainathan, 2004), and exploits the time dimension and the conditions established by the reform, which determine the worker's exposure to the health care expansion. This framework compares the results of a treatment group exposed to the policy change with another similar group, which feasibly represents the unobserved counterfactual evolution for the treated group. In this particular setting, the treatment group is made up of workers affected by the HR who had at least one child younger than 18 after the law was implemented in January 2008. The comparison group consists of private sector salaried workers with no children. The estimation strategy compares formality levels among workers with children younger than 18 years and workers with no children before and after the policy change.

This policy-experiment setup focuses on workers with children because they are the group directly affected by the health care coverage expansion. The variation introduced by the HR can be considered exogenous from the worker's perspective. Since the expansion in health care coverage might have differential effects if the relevant decision unit is the individual or the household, the analysis below is conducted at the individual and at the joint (household) level.

Finally, the time period used to obtain the estimates is 2001-2009, with 2001-2007 defined as the pre-policy period and 2009 as the post-policy period, while 2008 is used as the period to capture the behavioral adjustments of workers.

The following basic DD specification with controls is used in order to obtain the estimates:

$$Y_{it} = \alpha + \delta Children_{it} + \beta Children_{it} * Post + X_{it}' \gamma + \delta_t + \varphi_r + \varepsilon_{it} \quad (1)$$

where i index workers and t time; Y_{it} is an indicator variable representing the informality status of the worker, i.e. an indicator function equal to 1 if the worker is *not registered* in social security and 0 otherwise; $Children_{it}$ is a binary variable taking the value of 1 if the worker has at least one child less than 18 years old and 0 otherwise; $Post$ is a dummy equal to 1 in the post-policy period (year 2009) and 0 otherwise; and $Children_{it} * Post$ is an interaction term between those variables. The X_{it}

⁸ Gruber and Madrian (1995), Gruber and Hanratty (1995), Gruber (1996) and Yelowitz (1995) among others, use a similar approach to analyze the effect of health coverage extensions on different outcomes in the US labor market.

matrix contains individual and household covariates including age, gender, head of the household status, marital status, education, firm size, industry dummies, and number of children. Both δ_t and φ_r are a full set of year and department fixed effects, which account for any aggregate systematic shock to the individual's informality choice correlated with, but not caused by, the HR.⁹ Finally, ε_{it} is an error term. In this DD setup the parameter β captures the causal impact of the HR.

Estimates of equation (1) are obtained by a linear model (OLS) for binary dependant variables.¹⁰ The estimate of the impact of the HR may be interpreted as the average treatment effect on the treated (ATET), since the effect of the policy could be heterogeneous. Standard errors are clustered on *Children* and year group. To assess heterogeneity in the impact of the reform, the empirical application also explores different effects on labor informality by groups defined by gender, age, level of education and firm size.

The above DD model requires certain assumptions that must be satisfied in order to obtain a causal interpretation of the estimates. First, there are necessary identification assumptions: 1) aside from the expansion of health care coverage due to the HR, there are no other contemporaneous shocks that affect the informality choice of workers for both groups after the policy; and 2) in the absence of the policy change the underlying trends in informality levels (conditional on X) for both groups would be similar.

The plausibility of the first assumption is given by the fact that government welfare policies, which may have affected the labor market decisions of both treatment and control groups, are identifiable in the data, as described below. Hence, it is possible to control for any spurious correlations in the estimates. The second assumption can be verified by comparing pre-treatment trends, and by performing a series of “false experiments” and robustness tests.

⁹ Uruguay is divided in nineteen departments which represent the second administrative level of government. The main department is Montevideo (the nation's capital), where the majority of economic activity and population are concentrated.

¹⁰ Angrist and Pischke (2009) argue that linear probability model estimates do not differ substantially from those obtained by probit and logit, with the advantage that the DD estimate of β has a straightforward causal interpretation.

4 Data

The empirical analysis in this paper is based on repeated cross sections of household survey microdata from the *Encuesta Continua de Hogares* (ECH) for the years 2001 through 2009. The survey is a nationwide cross-sectional household survey, which is carried out by the Uruguayan National Institute of Statistics (*Instituto Nacional de Estadística*, INE). The ECH is the main source for information on income, employment and socio-economic characteristics of households and individuals. Additionally, this data is also employed by the government to calculate its official socioeconomic statistics.

Since 2001, the ECH includes a standard question, which asks respondents whether or not their current job entitles them to a pension or retirement savings. This question allows for quantification of the proportion of workers who are registered in the social security system.¹¹ Thus, this question is generally used as a proxy to identify a worker's formality status according to the legal definition (see Gasparini and Tornarolli 2009, for a discussion of alternative definitions in Latin America). In what follows, this constitutes the main dependent variable used for the econometric estimates.

Due to survey changes and the causal effect of interest, a subset of the total sample is used for the estimates. On the one hand, the ECH began including rural areas in 2006. Therefore, in order to maintain comparability, the sample used for the estimates is limited to individuals residing in urban areas containing more than 5000 inhabitants.¹² On the other hand, the sample is also restricted to private sector salaried workers, since they are the ones primarily affected by the policy change. As discussed above, public sector workers and the self-employed are not included in the analysis. Finally, the sample consists of adult individuals only, defined here as workers between the ages of 19 and 60.¹³ The final sample is a multi-year pool of ECH

¹¹ In addition, starting in 2008 after the implementation of the HR, the ECH also includes a question about whether or not individuals are entitled to health insurance by the NHS.

¹² Although this restriction results in some loss of information, more than 80 percent of the population in Uruguay lives in urban areas.

¹³ In Uruguay, the legal retirement age for private sector workers is 65. However, even while it is common for individuals to continue to work past this age, they are not eligible for the HR benefits. Younger salaried workers are also excluded since their health coverage might stem from their parent's formality status.

microdata, including the following years: 2001-2007 and 2009 (2008, defined as an adjustment period, has been omitted).

The treatment group (those exposed to the policy change) consists of all adult private sector salaried workers who reside in a household with at least one child younger than 18 years old. The control group consists of adult salaried workers in the private sector with no children.

Table 1 presents summary statistics for treatment and control groups in the pre-policy and post-policy period. This unconditional mean analysis reveals that both groups seem to show similar trends in all variables during the entire period. However, some differences arise. For instance, salaried workers in the control group are older, more educated and are less likely to be married in comparison to salaried workers with children (treatment group). These pre-existing differences indicate that even while both samples seem to be well-balanced, controlling for these individual characteristics may be necessary for unbiased estimation.

Figure 1 presents annual predicted probabilities of being informal for salaried workers with children (treatment group) and without children (control group) with controls for demographic characteristics.¹⁴ Formality levels are lower for the treatment group with respect to the control group. The sharp increase in predicted probabilities up to 2004 is due to the macroeconomic crisis experienced by Uruguay in 2002-2003, which affected the dynamic of the labor market.¹⁵ Despite the difference in levels, both groups exhibit similar trends during the pre-period under analysis, and there is a small but significant reduction in the gap between the two groups after the policy change.¹⁶ This graphical analysis is a first indication that the HR had an effect on labor informality by increasing incentives to become a registered worker, i.e., providing incentives for workers to move to formal employment. The following section presents econometric estimates of this effect of the HR on informality levels.

¹⁴ The set of controls includes gender, age, marital and head of household status, education and department indicators.

¹⁵ Possible sources of bias connecting to different responses to the crisis are addressed in the robustness section.

¹⁶ A test for differences of unconditional and conditional gap between treatment and control group from 2001-2007 indicates that, in both cases, the gap between groups remains constant at usual statistical significance levels. These results are available from the authors upon request.

5 The Effect of the Health Reform on Informality

5.1 Health Reform and Aggregate Informality Levels

Table 2 reports the primary results of implementing the empirical strategy in Section 3. The coefficients and statistics in the table correspond to the estimation of equation (1) by OLS. The first row presents the estimates of the coefficient of interest (β), which captures the impact of the HR on informality from different regression specifications. The second row shows estimates of the treatment's coefficient (*Children* in equation 1). The last row in the table shows the percentage of informal workers in the relevant population subgroup prior to the HR implementation. This statistic offers a useful measure to compare the magnitude of the estimated effects. In this table the columns correspond to different specifications of the model in equation (1) and estimates for different subsamples.

Columns (1)-(2) report the results for the full sample (salaried workers in the private sector). Column (1) presents an unrestricted model with no covariates, while the regression in Column (2) includes a matrix of covariates including worker's age, gender, head of household status, marital status, education, firm size, industry indicators and the number of children. Estimates are qualitatively similar with and without controlling for these covariates, although the magnitude of the HR impact coefficient (coefficient on *Children*Post* variable) is slightly larger in the restricted specification.¹⁷

This result indicates that the HR significantly induced private sector salaried workers with at least one child to switch to formal employment, with a change in the formality rate of about 1.3 percentage points. In terms of the pre-intervention average, this effect represents a 5 percent decrease in the probability to operate informally. This result, moreover, constitutes a lower bound of the incentive effect introduced by the expansion of health care coverage, since this main effect is probably moderated by the increase in the contribution of taxable labor earnings introduced by the HR (from 3 to 6 percent for the control group).

This interpretation of the empirical results in Table 2 depends crucially on the validity of the identification assumptions discussed in Section 3. While these are

¹⁷ These results do not change significantly with different combinations of controls in the equation (1) or if the department fixed effects are removed. The full outputs from the regressions presented and the alternative specifications are available from the authors upon request.

inherently non-testable, it is still possible to evaluate auxiliary hypothesis consistent with the assumptions. For instance, the presence of pre-policy trends that differentially affect salaried workers with and without children over and above controls for individual characteristics would indicate the presence of unobservable differences between the groups and a serious threat to the identification validity. If labor informality was diminishing for the treatment group with respect to the control before the HR, the estimates in Table 2 would be capturing a spurious correlation rather than the effect of the reform.

To address this issue, Table 3 presents the results from a series of “false experiments” using the sample restricted to the pre-reform period (2001-2007). In particular, the basic regression is re-estimated setting each of the years 2003-2006 successively as the period during which the policy was implemented. The estimates in Table 3 present the results of these simulated reforms for each pre-post policy simulation in Columns (1) to (4) for each year. The coefficient capturing the causal effect (the *Children*Post* interaction) is not statistically significant at standard levels for any of the mock reforms evaluated. The failure of finding any effects from these placebo estimates supports the assumption that the treatment and control groups exhibited similar trends (conditional on the observable control variables) before and after the policy change.

The results in Table 2, however, represent average effects for all workers in the sample. Previous studies for the region (Gasparini and Tornarolli, 2009) indicate that the level of informality varies for different socio-economic groups, and thus the HR may have had a differential effect on the incentives for these groups. In order to capture these heterogeneous effects, the above regressions are estimated for subgroups defined by worker characteristics such as gender, age, educational level and firm size. Table 4 summarizes these additional results. In terms of gender, the effect for men is not significant and very close to 0 (less than 0.3 percentage points). Most of the effects arise from the impact of the HR on salaried women – the effect is around 2.6 percentage points, and significant at the 1 percent level (Column 2). This represents a decrease of 7 percent from the pre-policy average for women. These results are qualitatively similar to those found by Juárez (2009) and Bosch and Campos-Vázquez (2009) for the Mexican programs PSMMG and Seguro Popular, respectively.

Effects by age group are provided in Columns (3)-(5) in Table 4. The effect of the HR is negative and statistically significant at the usual levels across all age groups

considered in the analysis. However, the impact is stronger for oldest workers in comparison to youngest workers both in absolute terms and relative to pre-policy average informality rate. For the youngest group (ages 19-29), the likelihood of working without contributing to social security falls by 1 percentage points (a decline of 3 percent), while for the oldest group (ages 50-60) the estimated impact is about a 2.1 percentage points decrease, which represents an 8 percent reduction.

Columns (6)-(8) in Table 4 present the estimates by educational levels. The results indicate a negative and statistically significant effect (at the 1 and 5 percent level, respectively) for workers with secondary and tertiary levels of education, and no significant effects on workers in the low educational group. For those with secondary education, labor informality decreases by 2 percentage points after the HR, while there is a 0.6 percentage point reduction rate for the tertiary education group. In both groups this impact represents a decrease of 8 percent relative to the pre-policy period average.

Finally, the last columns of Table 4 report the estimated effect of the HR according to firm size. The results demonstrate negative and statistically significant effects at usual levels for those employed in smaller (1 employee) and larger firms (more than 50 employees).¹⁸ Among salaried workers employed in small firms, the HR meant a 4.6 percentage point decrease in the likelihood of working without contributing to social security, compared to a 0.8 percentage point decrease for those employed in larger firms (Columns 9 and 12). These findings are consistent with the fact that in smaller firms the workers may have greater “capacity” to negotiate employment conditions with their employers.

In sum, the estimates show that the HR had a negative effect on the likelihood to be informal for salaried workers with dependent children, confirming the posited effect of the reform on incentives at the individual level. The heterogeneous effects uncovered in the analysis are also intuitive. Workers with low education levels have a substantially higher probability of operating informally, while those with middle or higher education probably have more space for negotiating their employment conditions. The significant effects found in very small enterprises confirm this insight, since it may be easier for workers in these companies to negotiate with the employer

¹⁸ The information recorded by the ECH does not allow extend the ranges of groups of those salaried working in firms of “more than 50 employees”.

and alter their formality status. Finally, the results seem to be driven mainly by female workers – the following section extends the analysis of results by gender by studying the effects of the reform at the household level.

5.2 The Impact of Health Reform on Intra-household Labor Arrangements

This section explores the possible effects of the HR on labor informality taking into consideration in the analysis the effects of potential joint decision-making of household members. The direction of the HR effect on formality probably depends on the existing intra-household allocation of employment relations prior to the reform. Restricting the analysis to households with two workers (the head of household and his/her spouse) and young children, there are three relevant types, as discussed in section 3.1: those where both spouses are informal employees (Type 1); households with one formal and one informal worker (Type 2); and those where both spouses are formal workers (Type 3).

The HR implies a potential incentive for Type 1 households to change the formality level of one of the spouses. If their valuation of health care coverage for their children exceeds its cost in terms of formal contributions, some Type 1 households have an incentive to become Type 2. For Type 2 households, on the other hand, the reform implies a benefit in the form of extended coverage at no additional cost – this group is strictly better off, but does not see its formality incentives modified. Finally, Type 3 households might face an incentive to become Type 2 with one of the members giving up their formality status, since health coverage for the children can be achieved by means of a social security contribution from only one member of the household. However, the worker moving to informality would lose other benefits related to the social security bundle – a move from Type 3 to Type 2 after the reform depends on whether the valuation of all other entitlements is lower than the reduction in contributions given by such a move.

To account for these formality status movements within the household in response of the HR, the original sample is restricted to households in which both spouses are salaried workers employed in private sector. The identification strategy relies on the same approach and assumptions as stated in section 5 to obtain causal interpretation of estimates. Therefore, the estimation strategy follows a similar

difference in differences setup. Two sets of estimations are conducted to test for possible different effects of the HR on labor informality decisions at household levels according to previous intra-household arrangements of formality status.

The first set of estimates compares the HR response of individuals whose spouses are employed in the formal sector to individuals whose spouses are employed in the informal sector. The discussion above indicates an expected effect of the policy change on salaried workers with children married to a worker employed in the informal sector, while the HR might not affect workers married to an employee in the formal sector since their children are already entitled to healthcare insurance. The estimates follow the structure of equation (1) but the samples are conditioned according to the characteristics of the worker's spouse. Table 5 reports the main results (the specification includes the same set of individual and household characteristics, year and department-fixed effects used in previous regressions; the standard errors are clustered at *Children*-year levels).

Columns (1) and (2) in Table 5 display the results for women married to a man in the formal and informal sector, respectively, while Columns (3) and (4) show the results for men married to women in the same sectors. As expected from the discussion, the effect of the HR on labor informality is negative and statistically significant at usual levels for workers whose spouses are employed in the informal sector. Meanwhile, the impact is small and statistically negligible for individuals married to workers operating in the formal sector. For women, the likelihood of working without contributing to social security decreases by 10 percentage points after the HR (Column 2), which represents an 18 percent decrease relative to the pre-policy period average. Among the men, the estimated effect approximates a 5 percent point decrease on labor informality, a decline of 14.5 percent relative to the pre-period average (Column 4).

These results support the notion that having a spouse in the informal sector increases the incentives for workers to contribute to social security following the introduction of the HR. The discussion above also predicted a reduction in the probability for households with children in which both spouses have an informal jobs (Type 2 group). To test for this possibility, a second set of estimates uses the household, as opposed to the individual, as unit of observation. This analysis uses the same difference in difference structure as before, where the variable of interest, *Children*Post*, is an interaction of having children and the post HR period. However, the dependent variable is defined at the household level. Specifically, the dependent

variable is an indicator equal to 1 if both spouses are informal, and 0 in cases where at least one household member is employed in the formal sector. As in previous regressions, the model controls for individual and household-level covariates and a full set of year and department fixed effects.

The results in Table 6 confirm the predicted effects. The estimates in Column (1) indicate a decrease in the proportion of households with children in which both spouses are informally employed. The HR results in a 4-percentage point decrease in the probability of both spouses in the same household having an informal job. This represents a 16 percent decrease relative to the pre-period treatment average.

Column (2) presents a second specification which tests for a re-allocation of households from those in which both spouses were in formal employment (Type 3) to a household (Type 2) in which only one spouse was formally employed. In this case, the dependent variable codes 1 if one spouse holds an informal job and 0 if both spouses are formally employed. While the sign of the coefficient of interest is negative, the estimate is small and not statistically significant at the standard levels. This result suggests that the possible incentives of the HR on a Type 3 household to become a Type 2 household may be attenuated by the unwillingness of the household in the face of one member losing other social security benefits.

As an additional check of the predictions discussed above, Column (3) of Table 6 compares households with both spouses operating in the informal sector with those where at least one spouse is formal. In these cases, there should be a (relative) decrease of the first type of households (Type 1) in response to the HR. The estimates confirm this prediction, with a 2 percentage points decrease in the likelihood of both spouses to be informally employed for households with children following the HR. This represents a 20 percent decline relative to the pre-period rates.

Taken together, the results are consistent with a situation in which extending the social benefits of formal jobs to workers' families (in this case to children) alters the incentives of households as a decision-making unit. In particular, the estimates suggest that the introduction of the HR increases the incentives for at least one spouse to contribute to the social security system and secure the additional benefits introduced by the reform. Additionally, the results show that in those households in which both spouses are formally employed the probability that the HR would prompt one spouse to give up their formal status remains negligible, suggesting a substantial valuation of the bundle of benefits provided by the social security system.

6 Robustness Checks

6.1 Estimates at the Individual Level

This section presents a series of robustness and specification tests of the results presented above. For the results at the individual level, these exercises are based on estimates of equation (1) with full controls for individual characteristics and year-department fixed effects with variations in the samples and the control variables.

A first set of alternative specifications with pre-reform trends is estimated using the full sample. The specification is similar to equation (1) but uses three separate variables of interest, which interact the *Children* indicator (treatment status) with dummies for different time periods. The omitted time period is 2007, the year before introduction of the HR (the coefficients are measured relative that year). Column (2) in Table 7 reports these estimates. The treatment effect, *Children*Post*, indicates a smaller effect (by 0.3 percentage points) compared to the main specification, but the effect remains statistically significant at the 1 percent level. The estimated coefficients for the pre-period interactions are not presented but they were found to be small and statistically insignificant at the usual levels, which provides further evidence of a lack of pre-existing differential trends among the treatment and control groups.¹⁹

It is also possible that the estimated impact of the HR is the result of unobservable shocks correlated with demographic characteristics that affect salaried workers with children and without children differently. To deal with this concern, a specification is estimated including interaction terms between the time dummies and the set of demographic characteristics. This result is reported in Column (3), which indicates that the estimated coefficient does not vary substantially and remains significant at usual levels.²⁰ In addition, Column (4) displays the results including both pre-period trends and interaction terms between the time dummies and demographic characteristics. Controlling for those factors does not affect the main conclusions.

¹⁹ In addition, the test of joint significance does not reject the null hypothesis that both coefficients are equal to zero. Results are available from the authors upon request.

²⁰ Due to space constraints, the table does not present the interaction terms. In general, they were found to be statistically insignificant.

Another concern might be the presence of systematic differences between treatment and control groups that vary over time. To control for this potential source of bias, the regression is estimated including interaction terms between the *Children* indicator and the entire set of demographic covariates. These results are presented in Column (5) of Table 7. The findings indicate that the estimated coefficient of interest remains unchanged, suggesting that there are no time-variant trends that affect the main results.

The following columns in Table 7 include additional robustness checks to the main specification. Column (6) presents the un-weighted regression results. The estimated coefficient of interest is statistically significant by around 0.2 percentage points less. Column (7) displays the results with more saturated control specification, which includes a full set of age, educational and children by age indicators. The coefficient of interest in this specification remains unchanged.

Finally, Column (8) presents the estimates restricting the sample to the period 2005-2009, which exclude the pre-reform period marked by the severe macroeconomic crisis of 2002-2003, which increased substantially aggregate unemployment and informality levels 2004. To the extent that the crisis impacted the labor behavior of the treatment and control group, it may contaminate the measured HR response. When the regression is estimated using the restricted sample the results show similar findings to the main specification.²¹

6.2 Estimates at the Household Level

The estimates reflecting decisions at the household level presented in Tables 5 and 6 were also subjected to a series of robustness tests. Robustness checks of these estimates should account for potentially differential changes in treatment and control households' labor prior to the introduction of the HR. These checks explore for the existence of pre-policy trends and systematic differences between both groups that might vary over time and that may bias the estimates. First, specifications that assume pre-program trends are estimated. Next, regressions are estimated including interaction terms between the *Children* indicator with a restricted set of demographic covariates.

²¹ When the sample is restricted to the periods 2004-2009 and 2006-2009, the findings remain unchanged.

Tables 8 and 9 report the estimates using these specifications, as well as the main results from Tables 6 and 7 for comparative purpose. The results show that even when the coefficient of interest (*Children*Post* variable) for some regressions reduces in magnitude, it remains statistically significant at standard levels. Thus, these tests suggest that differential trends on treatment and control groups do not drive the main results.

7 Conclusions

This paper analyzed the impact of the introduction of a health insurance reform on labor informality in Uruguay – the extension of health coverage to the children of private sector salaried workers which contribute to the social security system. The results indicate that the HR had a sizable impact on women, middle age and older workers, and for workers with secondary and higher education. In addition, the effect of the HR seemed to be more relevant for workers employed in small firms. This evidence suggests larger incentives for workers to become formal in jobs in which they have greater bargaining power, re-negotiating employment conditions with their employers or moving to other formal jobs. The evidence also indicated that household members react jointly to the change in the incentive structure implied by the extension of benefits to children.

The empirical results support the expected theoretical prediction that improving the benefits from a mandated social package provides additional incentives to become a formal worker. Furthermore, these results seem to be robust to different specifications and controlling for additional dimensions. The main finding is that labor informality decreased in Uruguay due to the HR's expansion of health care coverage, and workers and households were able to react to the new incentive structure. The results also imply a positive valuation of social security mandated benefits for a subset of the population.

Evidence that social security systems imply sizeable incentive effects for workers, and that workers react to these incentives, has serious implications for the design of labor market policies and social protection systems in developing countries. This is especially relevant in the context of the expansion of non-contributory elements such as conditional cash transfer programs. Further research could

concentrate on disentangling the workers' valuation of the different elements that constitute the bundle of social security benefits.

References

- Angrist, J. and J. Pischke (2008), *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press.
- Bertrand, M., E. Duflo, and S. Mullainathan, (2004), "How Much Should We Trust Differences- in-Differences Estimates?," *Quarterly Journal of Economics*, 119(1): 249-275
- Bosch, M. and Campos-Vázquez, R. (2010), "The trade-offs of social assistance programs in the labor market: The case of the "Seguro Popular" program in Mexico," Centro de Estudios Económicos Working Paper 12, Colegio de México.
- Bucheli M. (2004), "Uruguay: La cobertura de la seguridad social en el empleo, 1991-2002". In Fabio Bertranou (editor) *Protección social y mercado laboral. Santiago de Chile*, Oficina Internacional del Trabajo.
- Currie, J. and B. Madrian (1999), "Health, Health Insurance and the Labor Market," Chapter 50, in Orley Ashenfelter and David Card, eds. *Handbook of Labor Economics*, Amsterdam: North Holland, pp. 3309-3407.
- Eissa, N. and Liebman, J. (1996), "Labor Supply Response to the Earned Income Tax Credit," *Quarterly Journal of Economics*, vol. 111(2), pages 605-37.
- Ferreira-Coimbra, N.; Forteza, A. (2004), *Protección social en Uruguay: Financiamiento, cobertura y desempeño, 1990-2002* (Santiago, Oficina Internacional del Trabajo).
- Fields, G. (2005), "A Guide to Multisector Labor Market Models," World Bank Social Protection Unit Discussion Paper No. 50.
- Fields, G. (2009), "Segmented labor market models in developing countries". Retrieved on December 2010 from Cornell University, ILR School site: <http://digitalcommons.ilr.cornell.edu/articles/162/>.
- Galiani, S. and F. Weichelbaum, (2007), "Modelling Informality Formally: Households and Firms", CEDLAS Working Paper 47, Universidad Nacional de La Plata.
- Gasparini, L. and L. Tornarolli (2009), "Labor Informality in Latin American and the Caribbean: Patterns and Trends from Household Surveys Microdata," *Revista Desarrollo y Sociedad*, Universidad de Los Andes-CEDE, Colombia. Available as CEDLAS Working Paper 46, Universidad Nacional de La Plata.
- Gasparini, L., Haimovich, F. and Olivieri, S. (2007), "Labor Informality Effects of a Poverty-Alleviation Program," CEDLAS Working Papers 53, Universidad Nacional de La Plata.
- Gruber, J. (1996), "Disability insurance benefits and labor supply", NBER Working Papers 5866, National Bureau of Economic Research.

- Gruber, J. and B.C. Madrian (1995), "Health insurance availability and the retirement decision," *American Economic Review* 85: 938-948.
- Gruber, J. and M. Hanratty (1995), "The labor market effects of introducing national health insurance: evidence from Canada," *Journal of Business and Economics Statistics* 13: 163-174.
- Gruber, J. and Poterba, J. (1994), "Tax Incentives and the Decision to Purchase Health Insurance: Evidence from the Self-Employed," *Quarterly Journal of Economics*, MIT Press, vol. 109(3): 701-33.
- Heckman, J., and C. Pages (2004), "Law and Employment: Lessons from Latin America and the Caribbean", the University of Chicago Press for the National Bureau of Economic Research.
- Juárez, L. (2009), "Are Informal Workers Compensated for the Lack of Fringe Benefits? Free Health Care as an Instrument for Formality", mimeo, ITAM, México.
- Levy, S. (2008), *Good Intentions, Bad Outcomes: Social Policy, Informality and Economic Growth in Mexico*. Washington, D.C., The Brookings Institute.
- Maloney, W. (1999), "Does Informality Imply Segmentation in Urban Labor Markets? Evidence from Sectoral Transitions in Mexico", *World Bank Economic Review*, 13: 275-302.
- Perry G., W. Maloney, O. Arias, P. Fajnzylber, A. Mason, J. Saavedra-Chanduvi (2007), *Informality: exit and exclusion*, World Bank Latin American and Caribbean Studies, The World Bank.
- Summers, L. (1989), "Some Simple Economics of Mandated Benefits," *American Economic Review*, vol. 79(2): 177-83.
- Yelowitz, A. (1995), "The Medicaid Notch, Labor Supply and Welfare Participation: Evidence from Eligibility Expansions," *The Quarterly Journal of Economics*, 110: 909-939.

Tables

Table 1
Summary Statistics

	Control: salaried worker without children younger than 18				Treat: salaried worker with at least 1 child younger than 18			
	Pre (2001 - 2007)		Post (2009)		Pre (2001 - 2007)		Post (2009)	
	(N = 19573)		(N = 5380)		(N = 47906)		(N = 11250)	
	mean	sd	mean	sd	mean	sd	mean	sd
Informal	0.23	0.42	0.17	0.37	0.26	0.44	0.19	0.39
Number of children	0.00	0.00	0.00	0.00	2.14	1.19	2.05	1.14
Age	39.61	12.30	39.24	12.29	38.51	8.39	38.32	8.36
Man	0.52	0.50	0.52	0.50	0.53	0.50	0.52	0.50
Married	0.63	0.48	0.61	0.49	0.89	0.32	0.86	0.34
Head	0.69	0.46	0.68	0.46	0.63	0.48	0.63	0.48
Years Education	10.32	3.98	10.53	3.82	9.61	3.64	9.64	3.52
Region								
Montevideo	0.73	0.44	0.70	0.46	0.62	0.48	0.62	0.48
North	0.05	0.22	0.06	0.24	0.08	0.28	0.09	0.29
Centre - North	0.06	0.25	0.06	0.24	0.09	0.29	0.09	0.28
Centre - South	0.05	0.22	0.06	0.24	0.07	0.26	0.07	0.26
South	0.10	0.30	0.12	0.32	0.13	0.33	0.13	0.33
Firm size: 1 employ.	0.13	0.33	0.09	0.29	0.15	0.36	0.11	0.31
Firm size: 2-4 employ.	0.18	0.38	0.16	0.36	0.17	0.37	0.15	0.36
Firm size: 5-49 employ.	0.36	0.48	0.35	0.48	0.35	0.48	0.36	0.48
Firm size: + 49 employ.	0.34	0.47	0.40	0.49	0.33	0.47	0.38	0.49
Category of Industry								
Agriculture	0.04	0.20	0.04	0.20	0.06	0.23	0.06	0.24
Industry	0.10	0.30	0.09	0.29	0.12	0.32	0.11	0.31
Manufacturing	0.07	0.25	0.08	0.27	0.07	0.26	0.07	0.26
Construction	0.05	0.22	0.06	0.24	0.07	0.26	0.08	0.28
Trade	0.23	0.42	0.23	0.42	0.20	0.40	0.23	0.42
Transport/commun	0.07	0.26	0.08	0.28	0.08	0.27	0.08	0.27
Finance/professional	0.11	0.31	0.11	0.32	0.08	0.27	0.07	0.26
Education/health	0.19	0.39	0.17	0.38	0.17	0.37	0.16	0.37
Personal	0.14	0.35	0.12	0.33	0.16	0.37	0.14	0.35
Weekly hours worked	41.58	14.42	41.64	13.66	41.54	15.85	41.70	14.66
Hourly wage (usd PPP 05)	3.17	5.28	3.54	5.64	3.10	4.19	3.43	4.14

Note: Data are from survey years 2001-2007 and 2009 of the *Encuesta Continua de Hogares* (ECH). Sample includes salaried workers in the private sector in urban areas ages 19-60, employed at least one hour within the previous week. Informal equals 1 if the worker is entitled to retirement savings. Means are weighted with ECH supplement weights.

Table 2
Effect of Health Reform on Informality

	Sample: salaried workers in private sector	
	(1)	(2)
Children*Post	-0.0119*** [0.0037]	-0.0125*** [0.0033]
Children (<18 dummy)	0.0170*** [0.0040]	-0.0109* [0.0054]
Socio-economic Covariates	No	Yes
Dummies Time and State	Yes	Yes
Observations	84109	84109
R ²	0.04	0.31
Percent Informal (avge. 2001-2007)	26.33	

Note: Data are from survey years 2001-2007 and 2009 of the *Encuesta Continua de Hogares* (ECH). The dependant variable is informal status, which is equals 1 if the worker is not entitled to retirement savings. *Children* equals 1 if the worker has at least one child. *Post* equals 1 for year 2009. Controls include age, age-squared, gender, head of household status, marital status, years of education, years of education-squared, number of children in the household, and a full set of firm size, industry, departments, time dummies and a constant. Robust standard errors in brackets are clustered on children and year. Regressions are weighted with ECH supplement weights.

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

Table 3
False Experiments: Informality Before the Health Reform

	Sample: salaried workers in private sector in period 2001-2007			
	Post dummy activated in 2003 (1)	Post dummy activated in 2004 (2)	Post dummy activated in 2005 (3)	Post dummy activated in 2006 (4)
Children*Post	-0.0111 [0.0090]	-0.0061 [0.0073]	0.0037 [0.0065]	-0.0022 [0.0052]
Children (<18 dummy)	-0.0005 [0.0099]	-0.005 [0.0080]	-0.0109 [0.0075]	-0.0081 [0.0067]
Observations	67479	67479	67479	67479
R ²	0.31	0.31	0.31	0.31

Note: Data are from survey years 2001-2007 of the *Encuesta Continua de Hogares* (ECH). The dependant variable is informal status which equals 1 if the worker is not entitled to retirement savings. *Children* equals 1 if the worker has at least one child. *Post* equals 1 for year 2009. Controls include age, age-squared, gender, head of status, marital status, years of education, years of education-squared, number of children in the household, and a full set of firm size, industry, departments, time dummies, and a constant. Robust standard errors in brackets are clustered by children and year. Regressions are weighted with ECH supplement weights.

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

Table 4
Effect of Health Reform on Informality by Group Status

	By gender		By age group			By educational status			By firm size (number of employees)			
	Male	Female	[19-29]	[30-49]	[50-60]	primary	secondary	tertiary	[1]	[2-4]	[5-49]	[+50]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Children*Post	-0.0024	-0.0259***	-0.0104***	-0.0150***	-0.0215**	-0.0065	-0.0203***	-0.0058**	-0.0469***	0.0055	-0.0057	-0.0078**
	[0.0047]	[0.0037]	[0.0035]	[0.0039]	[0.0084]	[0.0082]	[0.0028]	[0.0025]	[0.0097]	[0.0077]	[0.0068]	[0.0029]
Children (<18 dummy)	-0.0182***	-0.0002	0.0055	-0.0289***	-0.0044	-0.0192	-0.0243***	-0.0071	0.0043	-0.0313*	-0.0084	-0.0058
	[0.0061]	[0.0070]	[0.0080]	[0.0069]	[0.0100]	[0.0148]	[0.0049]	[0.0060]	[0.0190]	[0.0159]	[0.0094]	[0.0052]
Observations	44171	39938	16633	54183	13293	20588	40574	16071	11453	14088	29755	28813
R ²	0.24	0.36	0.32	0.31	0.3	0.28	0.27	0.13	0.07	0.15	0.07	0.03
Percent Informal (avge. 2001-2007)	20.1	33.43	35.34	24.4	26.48	40.96	25.01	7.62	69.03	47.54	18.23	4.34

Note: Data are from survey years 2001-2007 and 2009 of the *Encuesta Continua de Hogares* (ECH). The dependant variable is informal status, which equals 1 if the worker is not entitled to retirement savings. *Children* equals 1 if the worker has at least one child. *Post* equals 1 for year 2009. Controls include age, age-squared, gender, head of household status, marital status, years of education, years of education-squared, number of children in the household, and a full set of firm size, industry, departments, time dummies and a constant. Estimations in columns (6) to (8) restrict the sample to salaried workers ages 25-60. Regressions are weighted with ECH supplement weights.

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

Table 5
Effect of Health Reform on Spouses' Labor Informality. Estimation Considering Pre-existing Intra-household Allocation.

	Regression universe			
	Women married to men in the formal sector	Women married to men in the informal sector	Men married to women in the formal sector	Men married to women in the formal sector
	(1)	(2)	(3)	(4)
Children*Post	0.0011 [0.0056]	-0.1006*** [0.0224]	-0.0062 [0.0052]	-0.0495** [0.0200]
Children (<18 dummy)	-0.0071 [0.0099]	-0.0124 [0.0281]	-0.0144 [0.0100]	-0.0596** [0.0229]
Observations	12317	2275	10929	3663
R ²	0.32	0.31	0.16	0.26
Percent Informal (avge. 2001-2007)	23.49	54.14	11.63	33.61

Note: Data are from survey years 2001-2007 and 2009 of the *Encuesta Continua de Hogares* (ECH). The original sample is restricted to households with salaried spouses. The dependant variable is informal status which is equals 1 if the worker is not entitled to retirement savings. *Children* equals 1 if the worker has at least one child. *Post* equals 1 for year 2009. Controls include age, age-squared, head of household status, years of education, years of education-squared, number of children in the household, and a full set of firm size, industry, departments, time dummies and a constant. Robust standard errors in brackets are clustered by children and year. Regressions are weighted with ECH supplement weights.

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

Table 6
Effect of Health Reform on Formality Joint Decision of Households. Estimation Results for Dependent Variable

	Dependent variable: formality status of spouses in the household		
	1 = Both informal 0 = Exactly one spouse formal	1 = Exactly one informal 0 = Both spouses formal	1 = Both informal 0 = At least one spouse formal
	(1)	(2)	(3)
Children*Post	-0.0421*** [0.0130]	-0.0058 [0.0057]	-0.0198*** [0.0041]
Children (<18 dummy)	-0.0663*** [0.0211]	-0.0232* [0.0111]	-0.0144 [0.0107]
Observations	4812	13466	14592
R ²	0.2	0.29	0.22
Percent both Informal (avge. 2001-2007)	26.16		9.75
Percent one Informal (avge. 2001-2007)		30.49	

Note: Data are from survey years 2001-2007 and 2009 of the *Encuesta Continua de Hogares* (ECH). The original sample is restricted to households with salaried spouses. In Column (1) the dependent variable equals 1 if both spouses in the household are not entitled to retirement savings and 0 if exactly one contributes to social security. In Column (2) the dependent variable is equals 1 if exactly one spouse in the household is not entitled to retirement savings and 0 if at least one spouse contributes to social security. In Column (3) the dependent variable equals 1 if both spouses are not entitled to retirement savings and 0 if at least one spouse contributes to social security. *Children* equals 1 if the household has at least one child. *Post* equals 1 for 2009. Regressions include controls for both spouses' characteristics (age, age-squared, gender, head of household status, years of education, years of education-squared, firm size and industry dummies) household's characteristics (number of children and income per capita quintiles at PPP 2005) and a full set of departments, time dummies and a constant. Robust standard errors in brackets are clustered by children and year. Regressions are weighted with ECH supplement weights.

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

Table 7
Further specification checks – individual level

Sample: salaried workers in private sector								
	Main result	Children - time dummies interactions	Demog. charact. - time dummies interactions	Includes (1) + (2)	Children - demog. charact. interactions	Unweighted regression	Saturated X's specification	Period 2005 -2009
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Children*Post	-0.0125*** [0.0033]	-0.0092*** [0.0002]	-0.0138** [0.0061]	-0.0145** [0.0065]	-0.0141*** [0.0032]	-0.0105*** [0.0020]	-0.0129*** [0.0034]	-0.0147*** [0.0026]
Children (<18 dummy)	-0.0109* [0.0054]	-0.0141*** [0.0043]	-0.0099 [0.0057]	-0.0092* [0.0050]	0.2168*** [0.0572]	-0.0088 [0.0072]	-0.0099 [0.0062]	-0.0073 [0.0072]
Observations	84109	84109	84109	84109	84109	84109	84109	60469
R ²	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.29

Note: Data are from survey years 2001-2007 and 2009 of the *Encuesta Continua de Hogares* (ECH). The dependant variable is informal status, which equals 1 if the worker is not entitled to retirement savings. *Children* equals 1 if the worker has at least one child. *Post* equals 1 for year 2009. All regressions control for age, age-squared, years of education, years of education-squared, (not Column (7), which includes a full set of age, education and number of children dummies), gender, head of household status, marital status, and a full set of firm size, industry, departments, time dummies and a constant. Coefficient estimates in Column (1) are taken from Table 2. Column (2) reports results with *Children* interacted with dummies equal to 1 for years 2001-2003, and years 2004-2006 (the omitted year is 2007). Column (4) reports results with demographic controls interacted with a full set of year-dummies. Column (5) reports results with demographic controls interacted with *Children* variable. Column (8) reports the results where the sample is restricted to years 2005-2009. Robust standard errors in brackets are clustered by children and year. Regressions are weighted (except for column 6) with ECH supplement weights.

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

Table 8
Effect of Health Reform on Spouses' Labor Informality Decision. Robustness checks.

	Women married to men in the formal sector			Men married to women in the formal sector		
	Main result	Children - time dummies interactions	Children - demog. charact. interactions	Main result	Children - time dummies interactions	Children - demog. charact. interactions
	(1)	(2)	(3)	(4)	(5)	(6)
Children*Post	-0.1006*** [0.0224]	-0.0515*** [0.0143]	-0.1005*** [0.0244]	-0.0495** [0.0200]	-0.0573*** [0.0090]	-0.0506** [0.0201]
Children (<18 dummy)	-0.0124 [0.0281]	-0.0632** [0.0264]	0.1358 [0.1078]	-0.0596** [0.0229]	-0.0512*** [0.0171]	0.1616** [0.0745]
Observations	2275	2275	2275	3663	3663	3663
R ²	0.31	0.31	0.32	0.26	0.26	0.26

Note: Data are from survey years 2001-2007 and 2009 of the *Encuesta Continua de Hogares* (ECH). The original sample is restricted to households with salaried spouses. The dependant variable is informal status which is equals 1 if the worker is not entitled to retirement savings. *Children* equals 1 if the worker has at least one child. *Post* equals 1 for 2009. Controls include age, age-squared, gender, head of household status, years of education, years of education-squared, number of children in the household, and a full set of firm size, industry, departments, time dummies and a constant. Coefficient estimates in Columns (1) and (4) are taken from Table 6. Columns (2) and (5) report results with *Children* interacted with dummies equal to 1 for years 2001-2003 and years 2004-2006 (the omitted year is 2007). Columns (3) and (6) report results with limited demographic controls (age, head of household status and years of education) interacted with *Children* variable. Robust standard errors in brackets are clustered by children and year. Regressions are weighted with ECH supplement weights.

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

Table 9
Effect of Health Reform on Formality Joint Decision of Households. Robustness Checks.

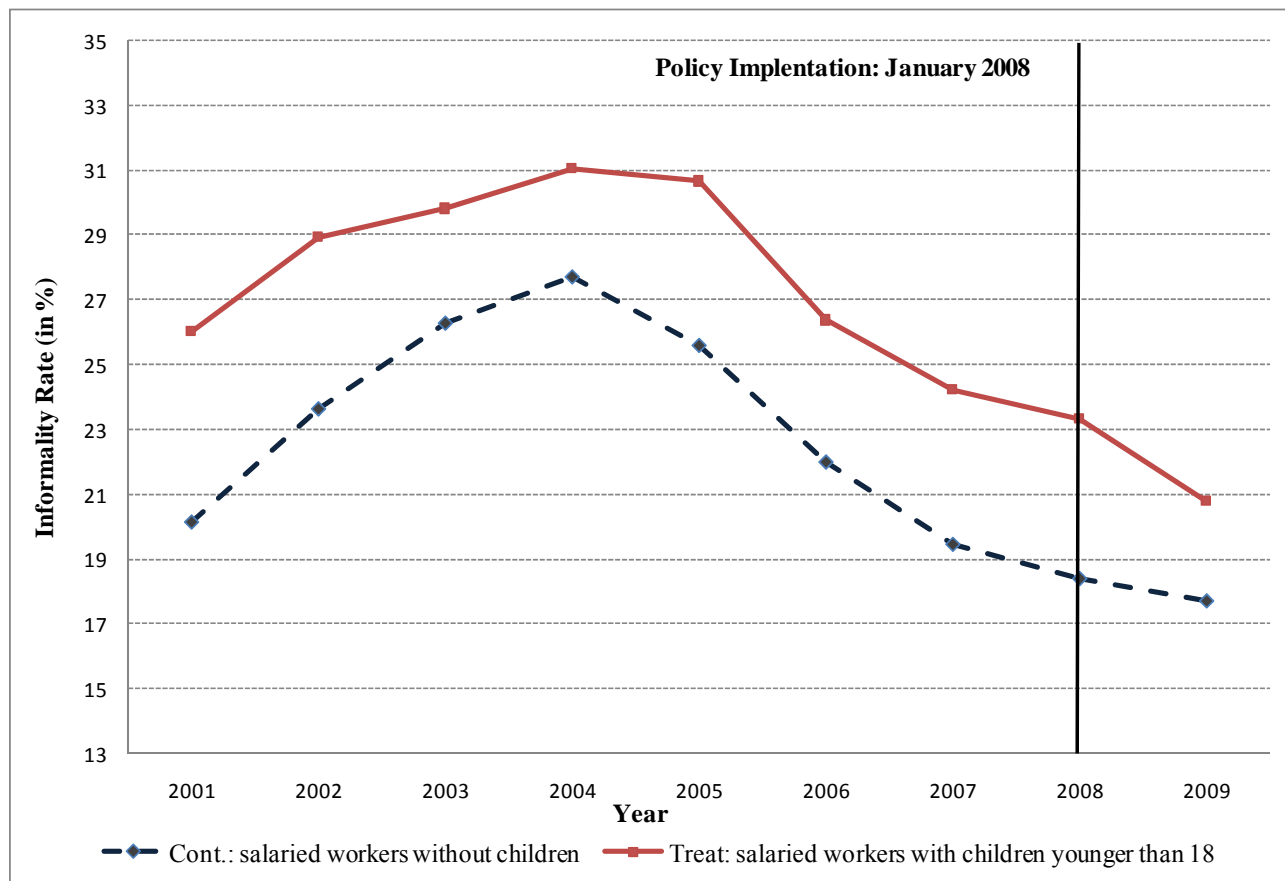
Dependent variable: 1 if both spouses are informal, 0 if exactly one spouse is formal			
	Main result	Children - time dummies interactions	Children - demog. charact. interactions
	(1)	(2)	(3)
Children*Post	-0.0421*** [0.0130]	-0.0156** [0.0073]	-0.0475*** [0.0131]
Children (<18 dummy)	-0.0663*** [0.0211]	-0.0925*** [0.0178]	-0.0049 [0.0810]
Observations	4812	4812	4812
R ²	0.2	0.2	0.2

Note: Data are from survey years 2001-2007 and 2009 of the *Encuesta Continua de Hogares* (ECH). The original sample is restricted to households with salaried spouses. *Children* equals 1 if the household has at least one child. *Post* equals 1 for 2009. Regressions include controls for both spouses' characteristics (age, age-squared, gender, household head status, years of education, years of education-squared, and firm size and industry dummies) household characteristics (number of children and income per capita quintiles at PPP 2005) and a full set of departments, time dummies and a constant. Coefficient estimates in Column (1) is taken from Table 7. Column (2) reports results with *Children* interacted with dummies equal to 1 for years 2001-2003 and years 2004-2006 (the omitted year is 2007). Column (3) reports results with limited demographic controls for both spouses (age, household head status and years of education) interacted with *Children* variable. Robust standard errors in brackets are clustered by children and year. Regressions are weighted with ECH supplement weights.

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

Figures

Figure 1
Predicted Informality Rates by Year and Treatment Status With Demographic Controls.
Period 2001-2009.



Note: Data are from survey years 2001-2009 of the *Encuesta Continua de Hogares* (ECH). The sample includes salaried workers in the private sector in urban areas, ages 19-60, employed at least one hour during the previous week. Informal equals 1 if the worker is entitled to retirement savings. The graph shows the predicted means trends for labor informality for salaried workers with (treatment group) and without children (control group) using OLS regressions with demographic controls. Controls include, gender, head of household status, marital status, years of education, age dummies and division dummies. Regressions are weighted with ECH supplement weights.