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ABSTRACT

The Impact of Colombia's Pension and Health Insurance Systems on Informality*

Social protection systems in developing countries are typically composed of a bundle of benefits, the major ones being health insurance and pensions. Benefit bundling may increase informality and decrease welfare. Indeed, if some of the benefits are valued at substantially less than their cost, workers may choose to forego all benefits, even though some other benefits are valued at or above their cost. We examine the impact of benefit bundling using a series of Colombian reforms. The key reform is the unification of the payment systems for health and pension, which made it more difficult to contribute differently to the one plan versus the other. Using the progressive roll-out of the unified payment system by firm size, we show that benefit bundling increases both full formality and full informality by about 1 percentage point. The increase in full formality is concentrated among salaried workers in small to medium firms, while the increase in full informality is concentrated among independent workers.

NON-TECHNICAL SUMMARY

In middle income countries that have a social protection system, the different components of the system are typically bundled and workers cannot opt out of some of these benefits. Since this social protection system is financed through payroll taxes, workers who put a low value on social protection have an incentive to evade payroll taxes and work informally. Because of the bundling of benefits, it is enough for some benefits to be perceived as much too costly for a worker to be willing to give up all benefits. Sadly, this can happen even if some benefits are perceived to be worthwhile by workers. We use the case of Colombia to illustrate the impact of benefit bundling on informality (full evasion of payroll taxes). While benefits for health and pensions used to have separate payment systems, Colombia introduced a common payment system, making it more difficult to contribute to only one of these benefits. We find that this tighter bundling of benefits led to an increase in informality, especially among independent workers. In practice, a number of independent workers were contributing only for health benefits prior to the reform, but they stop contributing for health benefits after the reform so as to avoid also contributing for pension benefits. On the other hand, salaried workers in small to medium firms were more likely to contribute to both health and pensions after the reform, thus becoming fully formal.

JEL Classification: I11, I18, O17

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I. Introduction

This paper examines how changes in the legislation governing health and pension benefits that took place between 2003 and 2009 in Colombia affected the informal and formal labor markets. A handful of studies have documented the impact on the changes of the labor legislation on the labor market since the 1990s; however these papers have not captured the most recent reforms aimed at unifying pension and health insurance contributions. This paper contributes to the understanding of the efficacy of policies aimed at increasing levels of compliance of contributions to health insurance and pension benefits for all workers, but in particular for independent workers. We define informal workers as those who are covered by neither the contributive health insurance system nor the pension system.

The key reform we examine is the unified health and pension system, which required employers to make contributions to these two plans through a unified system, thus making it more difficult to contribute differently to the one plan versus the other. Indeed, before the reform, some worker-firms pairs may have chosen to contribute only to the health insurance scheme or only to pensions. Additionally, even when contributing to both schemes, there was an incentive to contribute minimally to the health system (i.e. declare a low wage for the purpose of these contributions) since the benefits do not depend on the amount of the contribution, and to contribute larger amounts (i.e. declare a larger wage) to the pension system as benefits do depend on the amount of the contributions.

After the reform, the contributions to health and pensions have to be made together, on the basis of a single wage. Since the unified health and pension contribution system makes it more difficult to contribute only to health and not to pensions or the reverse, some workers may drop all coverage and become fully informal. Interestingly, the unified health and pension contribution system was

rolled out progressively between 2006 and 2007 as a function of firm size. Thus, the largest firms had to comply first, and smaller firms were given a longer time to comply. We use a difference-in-differences analysis where firms of different sizes constitute different treatment groups. We will also examine the effects of some other changes in the regulation of health and pension contributions, some of which may have decreased informality. These other changes also affected some groups of workers and not others, allowing again for a difference-in-differences analysis.

This paper contributes to the understanding of the effects of newer policies enacted to promote formality in the Colombian labor market, as most of the recent empirical literature has only studied the effects of the changes in the legislation up to the first half of the 2000s. We first show that overall, 35% of the workforce is fully formal in that they contribute to both health insurance and pensions. 40% is fully informal, contributing to neither. 24% of workers contribute to health insurance only, and only 1% of workers contribute to pensions only. This suggests that workers value health insurance benefits at their cost or more, while they value pensions at less than their cost. This pattern also implies that the unified system of payment for health insurance and pensions has the potential to significantly affect behavior. Our results suggest that indeed the unified system of payment for health and pensions significantly increased full formality and the overall coverage of the pension system by about 1 percentage point. This effect was concentrated among salaried workers in firms with 6 to 30 employees. At the same time, the unified payment system led to a 1 percentage point increase in full informality and a corresponding decrease in the coverage of the contributive health insurance. This effect is driven by independent workers who only contributed to health insurance prior to the reform and dropped all coverage after the implementation of the reform. It is important to note that some of the workers who dropped formal health benefits may be eligible for the SISBEN, the free public health benefit scheme available to individuals who meet a proxy means test (Camacho, Conover and Hoyos, 2009). Thus, the reform achieved its aim of

increasing the coverage of the pension system in the overall population, even though there was also a decrease in formal health coverage and an increase in full informality. It is important to note that, even after the unification reform, 22% of workers still declare contributing to health insurance and not to pensions (versus 25% before the reform). This is possible because independent workers earning one or less than a legal monthly minimum wage are not required to contribute to pensions if they are registered as low income independents.[2] There were also additional loopholes in the implementation of the system that limited the extent to which firms were forced to contribute to both pensions and health benefits in practice.

The other reform we examine is the unification of the base income for independents' health insurance and pension contributions. These contributions are calculated as a percentage of base income, and the reform demanded that the same base income be used to calculate the contributions to both systems. The impact of this reform on informality is not clear cut. Indeed, even though regressions suggest that this decreased full formality among independent workers, this result is driven by the fact that full formality among independent workers increased less than among salaried workers, and it is not clear that salaried workers are a good enough control for independent workers.

These results are important in that the unification of the payment system for health insurance and pensions is one of the rare reforms that have been documented to increase full formality, and it is the only recent policy that had this effect in Colombia. Additionally, the results suggest that, although the majority of workers value pensions at less than their cost, some of them value health insurance enough that they are willing to also contribute to pensions in order to keep their health insurance. It is important to notice that, despite the fact that the proportion of workers contributing

[2] The Ministry of Social Protection, with the Resolutions 0990 and 1155 of 2009, allowed low income independent to make their contributions to health benefits using the unified system (PILA). For these workers the resolutions do not require the payment of pension contributions, but the workers are required to be registered as low income independents as mandated by the decree 3085 of 2007. See Appendix 1 for more details.

to both pensions and health insurance increases after the unification of payments was introduced the base income reported to make these contributions might have declined. For example, before the reform, a worker may have declared that they are making 1.2 minimum wages, and they only paid health insurance contributions on the basis of this income. After the reform, this worker may contribute to both health and pension benefits, but on the basis of 1 minimum wage only. If such a phenomenon occurs, the unification might have detrimental fiscal effects for the contributive health system. Our data does not allow us to determine over what income they are reporting and therefore we are not able to quantify the fiscal effects of these reforms.

The paper is organized as follows; in the second section we review the literature on the effects of changes in the legislation governing pension and health care benefits on labor market outcomes. In the third section, we give an overview of the different reforms that took place between 2003 and 2008 and how we predict these changes to affect formal and informal workers. In the fourth section we present a description on the data we used for the analysis. In the fifth section, we present our estimation strategy. In the sixth section we present the results, followed by the conclusions in the seventh section.

II. Review of the Literature

For the purpose of this paper we define full informality as employment without health benefits and pension, and partial informality is having one benefit or the other but not both.[3] Loayza, Servén and Sugawara (2009) propose that informality arises when the costs of belonging to the economy's legal and regulatory framework exceed the benefits. "Thus informality is more prevalent where the regulatory framework is burdensome, the quality of government services is low, and the state's

[3] We exclude from the analysis all of the individuals that do not work for pay (family workers with no remuneration).

monitoring and enforcement capacity is weak."[4] The traditional view on informality has been that if the option were available, workers would choose to join the formal economy. More recently, studies have argued that informality is driven by choice rather than exclusion (Maloney (2004), Perry et al., (2007), and Pagés and Madrigal (2008)). It is not that workers are excluded from the formal economy, but rather that they make the choice not to join it.

Camacho, Conover and Hoyos (2009) argue that informality may be preferred if taxes or social security contributions exceed the workers' valuation of the services they provide. There are three main reasons why workers may prefer to contribute differently towards the acquisition of these benefits. First, if workers heavily discount the future they will value less any benefits they'll receive further down the line, and thus may prefer a form of compensation readily available in the present like having a higher wage. Second, some workers take advantage of a system in which pension and health benefits are separate. Workers will report their full incomes to qualify for higher pension benefits. But because everyone is mandated to pay proportionately to their income for a minimum level of health coverage, an incentive is created to report a lower income in order to pay less for the same minimum package. Essentially, they hide income to cheat the system. Third, the presence of public health care programs can drastically undermine individual willingness to pay for these benefits (Camacho, Conover and Hoyos (2009)). Additionally, Carrasquilla and Mejia (2010), find that the unification of benefits covered by the mandatory health care plan (POS for its Spanish acronym)[5] generates a moral hazard problem that directly undermines formal employment.

In order to address these issues and increase the percentage of individuals covered by health insurance and pensions, the government of Colombia has introduced a series of reforms aimed at increasing the number of individual contributions towards these benefits. Our purpose is to

[4] Loayza, Servén and Sugawara (2009), page 16.
[5] Plan Obligatorio de Salud (POS).

determine to what extent these changes in the regulatory framework have contributed towards a greater formalization of the economy. The reforms we describe in the following section aim at giving incentives to individuals and firms to contribute towards the system in an equitable way, eliminating incentives to evade contributions fully or partially. Still, we find that these reforms have certain loopholes for specific types of workers. In particular, stipulations for low waged independent workers allow them to keep contributing to health benefits but not to pensions; and for other workers the system is not able to guarantee that workers contribute to benefits over their actual income. In practice, we observe that some of the high skilled workers also contribute only to health benefits even after the unification.

IV. Pension and Health Benefits Reforms

In this section we discuss how these legislative changes have affected each type of worker. We divided the workers into two categories based whether they are salaried or independent. We expect that these different kinds of workers will be affected differently by the reforms, and will have different levels of compliance with the new regulations.

We start by defining how the costs of these benefits as a percentage of monthly income. For pensions, the payments are equivalent to 16 percent of the wage, of which 12 percentage points are paid by the employer and 4 percentage points are paid by the employee. For health benefits the contributions are equivalent to 12.5 percent of the wage, the employer pays for 8.5 percentage points while the employee pays 4 percentage points. For salaried workers, both the deduction and payment of benefits are made by the firm.

1. Independent workers

March 1st 2003: the change in regulation established that the same base income has to be used to contribute to both health and pensions. Before the reform, independent workers were likely declaring a lower base income for health contributions than for pension contributions, since health insurance benefits are not tied to the amount of the contributions, while pension benefits are directly linked to the amount of the contribution. This reform aimed to reduce the double accounting in contributions, by linking benefits to the same income. We expect this policy to increase the amounts contributed to health insurance and decrease the amounts contributed to pensions for those independent workers who contributed to both systems. The reform may however have little impact on informality for independent workers. Indeed, for those who were contributing only to health or only to pensions, the new requirement that the same base income be used for both systems probably does not provide a strong enough incentive to contribute to both systems.

April 1st 2007: unified health and pension payment system. This should in principle make it impossible to contribute only to one of the systems. In practice, there are some exceptions and loopholes we noted above. This reform should incentivize some independent workers who previously contributed only to health to contribute to both systems, while others will drop their health insurance to avoid contributing to pensions. Dropping contributive health insurance may seem particularly appealing for workers who can qualify for the free public health insurance scheme by meeting the SISBEN proxy means test.

2. Salaried workers

For salaried workers, the key change is the unified system of payment for health and pensions and the ability for workers to verify employers' contributions. The law should reduce the proportion of workers whose employer contributes either only to health or only to pensions, and may increase the proportion of workers who are informal, contributing to neither health nor pensions.

The table below summarizes the timing of the introduction of the reform:

Firms	Date
1.500 or more employees	**August 1st 2006**
500 -1500	**October 1st 2006**
100 -500	**December 1st 2006**
30 -100	**February 1st 2007**
Less than 30	**April 1st 2007**

V. Data

We use two separate sources of data. First, we use the Continuous Household Survey 2001-2005 (ECH for its acronym in Spanish). The ECH is a repeated cross-section of household survey data collected by the National Statistics Department (DANE). The weighted sample is representative of the urban population of the 13 largest metropolitan areas in the country. The data includes individuals between 12 and 65 years old.

Information in the ECH consists of four basic chapters: (i) identification variables; (ii) household characteristics; (iii) education and (iv) labor force information. In addition, a special module on informality takes place in the second quarter of every year for the period 2001-2005. In these module individuals are asked to report their sector of employment, type of contract, firm size, whether or not they have a written work contract, and if they make contributions to employment based health insurance and pensions.

The second source of data is the Great Integrated Household Survey 2006-2009, (GEIH for its acronym in Spanish). The GEIH is a repeated cross sectional data that collects information representative of the 24 largest metropolitan areas; however we restrict the analysis to the 13 largest areas to keep consistency across surveys. In the GEIH the information on informality is available in

a monthly basis rather than for a single quarter of the year. In addition, a richer set of questions on informality is available as well as a large number of retrospective questions on employment histories.

The analysis is based on the information contained in the "informality" module of both the ECH and GEIH. It includes data on firm size, job tenure, written contracts, job location and access (and contributions) to social security (pensions and health care). There are some retrospective questions about previous job characteristics including type of work, economic activity and firm size. Particular information is available for specific waves such as whether the worker has a written job contract, whether the firm is registered and/or has formal accounting. We drop unpaid family workers from our sample, since unpaid workers are not required to contribute to the social security system. We classify workers in three separate categories by their type of employment as follows: salaried, independent self-employed and independent employers. The data allow us to estimate the effects of the different reforms that took place between 2003 and 2007. The next section presents a simple theoretical model and its predictions.

VI. A Simple Theoretical Model

Assume p is the contribution rate for pensions and h for health, while P is the per period benefit of pensions and H is the per period benefit for health insurance. The wage is w. For **people who are fully informal** before the unification, we must have:

$$hw > H \text{ and } pw > P$$

They should not be changing their status after the reform. For **people who only pay health insurance before the unification**, we must have:

$$hw \leq H \text{ and } pw > P$$

After the unification, these people fall into two categories. First, some people become fully informal. For them:

$$pw + hw > P + H$$

Using what we know from their behavior before the reform, we can infer that:

$$hw \leq H < pw + hw$$

In other terms, although they value health benefits at or above their costs, they certainly value them at less than the contributions to both pensions and health.

Second, some of these people become fully formal. For them:

$$pw + hw \leq P + H \text{ and } (pw - P) + hw \leq H$$

In other terms, the benefit of health insurance is strictly greater than its cost by an amount at least equal to $pw - P$, which we know is strictly positive since for pensions the cost exceeds the benefits. For the inequality above to hold, it must be that either P is quite large even though it is smaller than pw or H is very large. If in the limit P=0, then the above inequality implies that health benefits are worth at least the full contribution to health and pensions.

The above model assumes that the choice is determined by the worker alone. In fact, firms also take part in the decision and the risk of getting fined in case of non compliance will also play a role.

The next section presents the estimation strategy followed by our estimation results.

VII. Econometric specification

We want to estimate the impact of two different reforms on labor market outcomes. The first reform is the obligation for independent workers to use the same base income to contribute to both

health and pensions; we label this reform "Unification: base income for independents" or R1. This is coded by a dummy that equals one for independent workers from March 2003 onwards and 0 otherwise. For the "Unification: base income for independents" or R1, the treated group is all independent workers while the control group is all salaried workers. The second reform is the unified system of payment for health and pensions, which we label simply "Unification" or R2. As explained above, this has been rolled out by firm size. To have a sufficiently long period prior to the reform, we must use the firm size categories that are available in the 2001-2005 surveys. As a result, unification is a dummy that is equal to one if firm size is 11 or more workers and the date is February 2007[6] or later, and it is also equal to 1 if firm size is 10 workers or less and the date is April 2007 or later. Otherwise, the unification dummy is equal to 0. Note that independent workers are included in the firms with fewer than 10 workers category. Firms with less than 11 workers serve as a control for firms with 11 workers or more when these larger firms are bound by the unification reform, while firms with 11 workers or more serve as a control group when smaller firms are affected by the unification reform.

The specification we use is the following:

$$y_{it} = \alpha_1 R1 + \alpha_2 R2 + \beta X_{it} + \epsilon_{it}$$

y_{it} is the labor market outcome of interest for individual *i* in calendar month *t*. R1 is the dummy for unification, R2 is the dummy for unification of the base income for independents. X_{it} is a set of controls. We always include the following in the set of controls: dummies for firm size category, independent dummy, month and municipality fixed effects. In specifications with additional

[6] Firms with 30 workers are more are bound by the unification reform by February 2007, while firms with less than 30 workers and independents are affected in April 2007. Since we don't have a breakdown of firm size above 11 workers in the data prior to 2006, we choose to consider as treated in February 2007 all firms with more than 11 workers, and treated in April 2007 all firms with 10 workers or fewer. This obviously introduces some noise in the definition of treated and control groups, but we also use more detailed firm size categories when we restrict the sample to 2006 and later.

controls, we include the following: years of schooling, age, age squared, number of children, female dummy, and a dummy for those who are married or cohabiting. All regressions use robust standard errors.

Thus, to identify the effect of the reforms under consideration, we use a difference in differences strategy. For the unification of the base income for independents, we use all other salaried workers as a control group. To identify the impact of the unification, we use two firm size categories (above or below 10 workers) that serve as a control for each other, since the reform was introduced in a staggered fashion.

In order to see whether the impact of the unification reform differs by firm size, we adopt two additional specifications. First, we allow the reform to differentially impact each of the four firm size categories present in the data since 2001: 1 worker, 2 to 5 workers, 6 to 10 workers, and more than 10 workers. Second, we use the more detailed firm size categories available from the second half of 2006 onwards: 1 worker, 2 to 3 workers, 4 to 5 workers, 6 to 10 workers, 11 to 19 workers, 20 to 30 workers, 31 to 50 workers, 51 to 100 workers and more than 100 workers. This allows us to track more precisely the timing of the introduction of the unification reform for firms above 100 workers, between 30 and 100 workers and below 30 workers. We will focus more narrowly on firms close to the 100 worker threshold or to the 30 workers threshold (see table above for the timing of the introduction). This is important because control and treatment groups should be as similar as possible to each other, and in particular, they should react similarly to macro trends. Another issue here is that since our data is not a panel, workers may move between firms of different sizes, and between salaried and independent status. This means that the treatment and control groups can change composition over time. Because we do not have panel data here, we are not able to track workers across firms. However, we control for observed worker characteristics, which partially

alleviates some of the concerns regarding changes in composition. Additionally, in as much as firms of different sizes are seen as the treatment and control groups and not individual workers, the movement of workers between different firm sizes becomes less problematic. Indeed, the question becomes then whether firms of different sizes became more or less formal after the unification reform. Still, this compositional issue is something to keep in mind when interpreting our results.

VII. Results

Table 1 shows summary statistics. 36% of the workforce is fully formal in that they contribute to both health insurance and pensions. 40% is fully informal, contributing to neither. 59% of workers contribute to health insurance, and only 36% to pensions. This shows that there are essentially no workers that contribute only to pensions (less than 1%), while about a fourth of the workforce contributes only to the health insurance scheme. This situation rationalizes the government's desire to unify the health insurance and pension systems in order to increase the coverage of the pension system.

We then plot a number of graphs using raw means to show how various labor market outcomes evolve over time. In Figure 1, we plot the evolution of formality and informality. The share of the workforce that is fully informal (i.e. contributes to neither health insurance nor pensions) declines from 2001 to 2006 at a roughly constant rate, and stays about constant thereafter. By contrast, the share of workers that are fully formal increases at a roughly constant rate until 2005, slightly declines between 2005 and 2006, then increases strongly from the third quarter of 2006 to the third quarter of 2007, and finally stays roughly constant. Finally, the share of workers that contribute only to health insurance seems to decline at a roughly constant rate over the whole period. These trends suggest that the unification reform may have increased full formality, since the increase in full formality coincides with the roll-out of the unified payment system. Full informality did not

particularly increase during the roll-out of the unified payment system, but there is some uptick in informality later on. This graphical analysis thus suggests that the unified payment system may have increased full formality while the impact on full informality is less clear.

It is also interesting to look at the share of workers that are covered by either health insurance or pensions. As

Figure 2 shows, the coverage for both has increased over time, and the increase has been stronger during the roll-out of the unified payment system, and stronger for pensions. Again, this suggests that the unified payment system may have increased the coverage of both health insurance and pensions.

Figures 3 and 4 plot the evolution of coverage separately for salaried and independent workers (all percentages in the figures are expressed as a share of the total workforce). First, we can see that the increase in full formality during the roll-out of the unified payment system mostly happened for salaried workers (Figure 3). Interestingly, the informality of independent workers increased during the roll-out of the unified payment system (Figure 4), which suggests that firms may have shifted the workers they wanted to keep informal to an independent status. Additionally, we can see that there is no clear trend break for independent workers in 2003, which seems to indicate small effects if any for the unification of the base income for health insurance and pensions. On the other hand, full formality increased at a slower pace for independent workers after 2003 than for salaried workers, which suggests that the unification of the base income for health insurance and pensions may have had slightly decreased full formality for independent workers relative to salaried workers.

Figures 5 and 6 use the detailed firm size break-down that is available from August 2006 onwards to further investigate the impact of the unification on full formality and full informality. Specifically, we compare firms with 21 to 30 workers, for whom the unification happened in April 2007 with firms

with 31 to 50 workers, for whom the unification happened in February 2007. These two types of firms should be very similar except for the fact that the unification reform affected them at different dates. In Figure 5, we can see that full formality increases after the unification reform is introduced in firms with 31-50 workers, and especially during March 2007. By contrast, in firms with 21 to 30 workers, full formality stays almost flat until March 2007. This suggests that the uptick in full formality in firms with 31-50 workers in March 2007 may be due to the unification reform. On the other hand, when the unification reform kicks in for firms with 21 to 30 workers, in April 2007, full formality increases slightly in these firms while it decreases in firms with 31-50 workers. This suggests that the unification reform may have increased formality in firms with 21 to 30 workers. Figure 6 tells a similar story for full informality. When firms with 31-50 workers faced unification, full informality increased relative to full informality in firms with 21 to 30 workers (period between February 2007 and March 2007). And when firms with 21-30 workers faced unification, full informality increased both in absolute value and relative to full informality in firms with 31-50 workers (see specifically April 2007). Overall, this suggests that the unification reform increased both full formality and full informality in medium firms, but a more formal statistical analysis is needed to confirm these preliminary impressions.

We now turn to our regressions. In Table 2, we examine the impact of the two reforms on full formality and full informality, while in Table 3 we look at health insurance and pension coverage. According to the specification in column 1, Table 2, the unified payment for health insurance and pensions significantly increased full formality by 0.5 percentage points for salaried workers, but this impact is not statistically significant. The unification of the base income for independents seems to have decreased full formality by 6.6 percentage points. Adding more controls in column 2 increases the point estimate for the unification of health and pensions: the impact of the unification reform on full formality is now a significant 0.97 percentage point. In column 3, we add an interaction between

the unification reform and the independent dummy in order to test whether indeed there is evidence that firms that were required to comply with the unified payment system shifted some salaried workers to an independent status. If that's the case, the impact of the reform on salaried workers should be bigger than 0.97 percentage point, and the impact on independent workers should be smaller, implying that the interaction between unification and independent should be negative. This is indeed what happens in column 3: the unification reform significantly increased full formality for salaried workers by 3.09 percentage points, and significantly decreased full formality for independent workers by 1.6 percentage points. Once this interaction is added, the impact of the unification of the base income for independent is halved, showing that some of the decline in full formality for independent workers is due to the unification reform. In columns 4-6, we examine the impact of the two reforms on full informality. In the specification with controls, we find that the unification reform slightly increased full informality by 0.8 percentage point. There is no significant effect of the unification of the base income for independent workers on full informality in column 5. The addition of an interaction between the unification and independent dummies in column 6 shows that full informality for salaried workers was unaffected by unification, while unification significantly increased full informality for independent workers by 1.74 percentage point.

Table 3 shows that, overall, health insurance coverage declines by 1 percentage point with the unification reform (col. 2). When adding an interaction between unification and independent in column 3, we find that the unification reform did not affect health insurance coverage. On the other hand, the unification reform significantly decreased health insurance coverage for independent workers by 1.5 percentage point. This result is consistent with the increase in full informality that we documented for independents in Table 2. With respect to pension coverage, we should expect the results to look very similar to the results for full formality in Table 2: indeed, there are essentially no workers who only contribute to the pension system, and hence any worker that contributes to

pensions is fully formal. The unification reform significantly increased pension coverage by 1.18 percentage point (column 5), which corresponds to the increase in full formality documented in Table 2. By contrast, the unification of the base income for independents seems to have significantly decreased pension coverage by 6.35 percentage points, which corresponds to the decline in full formality documented in Table 2. Column 6 shows that pension coverage significantly increased by 3.36 percentage points for salaried workers while it significantly decreased by 1.5 percentage point for independents. Similarly to what happened in Table 2, once we add the interaction, the impact of the unification of the base income for independents is halved. We estimate these regressions clustering at the firm level; while the significance of some of the estimates vanishes, the effect of the unification reform on pensions, that significantly increased coverage by 1.18 percentage point (column 5) is still robust to this specification.

Table 4 shows the results by firm size[7], using the whole period of study (2001-2009). The unification appears to have a detrimental effect on full formality for the smaller firms (1 worker; this includes both salaried workers in a firm where they are the only employee, and independent workers in a firm with one or zero employees), reducing it by 1.98 percentage points (col. 2), while full informality increases by 1.26 percentage points after the unification (col. 4). As expected, for firms with one worker, both contributions to health benefits and pensions decline by 1.4 and 1.9 percentage points respectively (cols. 6 and 8). The unification made it more expensive to contribute to these benefits and workers in smaller firms are more likely to drop all contributions.

The unification does not appear to have a statistically significant effect on full formality for firms of 2-5 workers, but it appears to have a statistically significant and positive effect on full informality, increasing it by about 2.5 percentage points. For these firms of 2-5 workers, health contributions

[7] The unification dummy is interacted with each of the firm size categories, and the main term for unification is omitted.

decline by 2.65 percentage points, while contributions to pensions do not appear to change (cols. 6 and 8). These results are not surprising as we expected workers who only contribute to health insurance to potentially drop all coverage. For firms with 6-10 workers, the payment unification appears to have a much larger effect on full formality, increasing it by about 5.77 percentage points, and full informality increases by 1.13 percentage point. Contributions to health benefits decline by 1.68 percentage points, while contributions to pensions increase by 6.23 percentage points. The results suggest a large increment in full formality in this firm size category, with a larger fraction of workers contributing to pension benefits after the unification of payments was introduced. For firms with more than 11 workers, the effects on full formality are similar in magnitude to those of 6-10 workers, with an increase in full formality of about 5.12 percentage points after the unification of payments was introduced. The effect on full informality has a negative sign but is not statistically significant. There is also no effect on health insurance contributions, but a rather large and positive effect on contributions to pensions of about 5.56 percentage points. The results presented in table 4 suggest that workers in smaller firms who only contributed to health insurance prior to the reform will most likely drop all coverage and become fully informal, as it is now more expensive to jointly contribute for benefits, while workers in larger firms will be more likely to become fully formal. However, we are not able to test whether the increase in full formality has a positive effect in fiscal terms for contributions to health insurance, as we do not observe the base wage used to contribute to the system, and as we mentioned before it is quite possible that a large number of workers are under-reporting their wage to make lower effective payments for these benefits.

In tables 5 and 6 we restrict the sample to the Gran Encuesta Integrada de Hogares 2006-2009, as the survey allows for a finer classification of firm size, as well as allowing us to separate independent workers into two categories, namely self employed workers and employers. In table 5, we run regressions differentiating firms with 50-100 workers and firms with more than 100 workers, and in

table 5b we estimate these results by firm size separating the independent workers category. For these firms the effect of the unification reform appears to be limited to independent workers. Some independent workers operating in these firms became formal after the unification of payments was introduced, with an effect of 4.74 percentage points (cols 1 and 2). Before the reform, some firms operated in a gray zone, and after the reform decided to comply more, in particular by contributing largely with pensions, with a positive effect of 4.9 percentage points (cols. 7 and 8). We also find that the effect of the unification on independent workers is fully concentrated among self employed workers who presumably are hired by the firms as fully formal contract workers after the reform (Table 5b). The unification increases full formality by 4.99 percentage points for these workers, while it increases pension uptake by 5.1 percentage points (Table 5b, cols 2 and 8, respectively).

Table 6 shows the results for small to medium size firms (6-50 workers), and table 6b shows these results separating independent workers into self employed workers and employers. The results suggest that the unification reform increased full formality by 4.5 percentage points for workers in firms of 6-10 workers, 4.2 percentage points for firms 11-19 workers, and 3.8 percentage points for firms of 20-30 workers, with no statistically significant effect for firms with 31-50 workers (as shown in col. 2 of table 6). The unification reform does not appear to have a statistically significant effect on full informality for these medium size firms, or on the take up of health insurance. The unification however increases pension contributions: in particular, we observe an increase of 4.89 percentage points for firms with 6-10 workers, 3.92 percentage points for firms with 11-19 workers, and 3.53 percentage points for firms with 20-30 workers (col.8). Again the effect of the reform on pension contribution of firms with 30-50 workers is not statistically different from zero. For all firms between 6 and 30 workers, we find a positive effect of the reforms on full formality, and in particular the effect appears to be a result of a larger likelihood of complying with pension contributions. Interestingly, the magnitude of the positive effect appears to decline as firm size

increases. This is plausible as larger firms are expected to be more compliant with these contributions even before the unification system was implemented. Table 6b shows that, in these small firms, the positive effect of the unification reform on full formality was concentrated among salaried workers. Full formality for self-employed workers increased significantly less than for salaried workers, with an increase between 5 and 2 percentage points for salaried workers, and a 3.46 percentage points smaller effect on full formality for self employed workers (col. 2 table 6b). The unification does not appear to have a statistically significant effect on full formality for employers in small firms. At the same time, full informality increased among self-employed workers in these firms, with an increase of the order of 3.8 percentage points (col. 4 table 6b). The impact of the unification reform on employers was not statistically significantly different from the impact on salaried workers.

Overall, we find that the unified system of payment for health and pensions mostly affected smaller firms with less than 30 workers. The reform's basic aim was accomplished for firms with 6 to 30 employees, since these firms increased the proportion of formal workers. On the other hand, the perverse effect of the reform in increasing informality was observed in firms with less than 5 employees, and among self-employed workers. This pattern of results makes sense. Indeed, larger firms were presumably not on the margin of choosing between full formality and full informality, so this likely explains the absence of a significant effect for firms with more than 50 employees. At the other extreme, for very small firms and self-employed workers, the unified payment system increased the cost of contributions so much that many decided to operate fully informally. In the middle, some medium firms were able to absorb some extra costs and become fully formal. The overall impact of the unified payment system reform was to increase full formality and pension coverage, while full informality also slightly increased.

Additional Robustness checks

In order to control for any macro effects we control for both city and year fixed effects. A problem only arises if different firm sizes are affected differentially by macro events such as changes in minimum wages, changes in tariffs and unionization. Yet, we restrict control and treatment groups to be very close in size to avoid any confounding effects. However, we cannot choose very close treatment and control groups for very small firms since the lowest threshold for the implementation of the unified payment system reform was 30 workers. Additionally, the rollover of the reform was relatively fast, so manipulating firm size to gain a few more months to comply with the regulation is not too attractive an option.

It is tough to find a good control group for independent workers: on the one hand they clearly work in small firms. On the other hand we know from previous studies that they tend to be happier with their jobs than the informal salaried. In order to find a good control group for independent workers, we compare them to salaried workers in small firms, and further divide the independent category in two groups, self employed and employers in order to provide a better control group for these workers. Our results show that, when we compare independent workers to employees of small firms, there is no significant change in our estimates. Further comparing self employed workers and employers we find that the estimates presented are consistent.

VIII. Conclusions

Our results show that the unified payment for health and pensions had a substantial impact on formality, informality and the coverage of pensions. While many of the provisions of the Colombian system, like the subsidized health care regime, appear to have largely contributed to the expansion of the informal labor market, the regulations that unified the system of payment for health insurance and pensions significantly increased full formality.

Our results suggest that indeed the unified system of payment for health and pensions significantly increased full formality and the overall coverage of the pension system by about 0.97 and 1.18 percentage points respectively, while at the same time decreasing the coverage of the health insurance system by about 1 percentage point. This decline in health insurance take up is fully concentrated among independent workers. Full informality also increased, and again this increase was fully concentrated among independent workers, in particular those self employed. Finally, the introduction of the unified payment system had different effects by firm size category, with the largest firms being unaffected. Medium firms increased full formality and small firms increased full informality.

Our results suggest that the reforms were largely successful in increasing the coverage of the pension system in the overall population. The increase in the share of individuals who contribute to both health and pension benefits constitutes a positive change. However, policy makers should be mindful of the negative impact of the unification of payments on the coverage of the contributive health insurance system among independent workers. Finally, we are not able to determine whether the total amount of contributions increased given the nature of our data. This is thus an interesting area of investigation for future research.

IX. References

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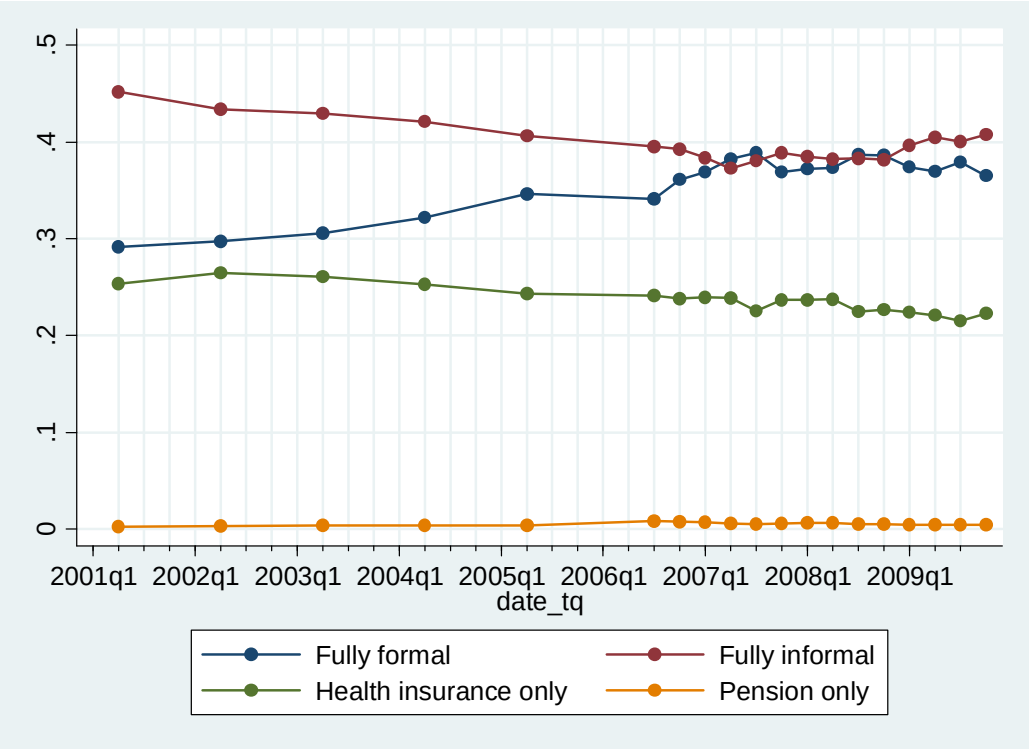
Table 1: Summary statistics

	Obs	Mean	Std. Dev.	Min	Max
Fully Formal	714,541	0.36	0.48	0	1
Fully Informal	714,541	0.40	0.49	0	1
Health Insurance	714,262	0.59	0.49	0	1
Pension	714,262	0.36	0.48	0	1
1 worker	714,541	0.37	0.48	0	1
2 to 5 workers	714,355	0.22	0.41	0	1
6 to 10 workers	714,355	0.06	0.24	0	1
11 or more workers	714,355	0.35	0.48	0	1
Independent	714,541	0.45	0.50	0	1
Schooling	713,394	9.34	4.20	0	26
Age	714,541	38.28	12.94	12	99
Number of children	714,541	1.40	1.28	0	14
Female	714,541	0.45	0.50	0	1
Married or cohabitating	714,541	0.56	0.50	0	1

Note: The sample is restricted to independent workers and salaried workers who work for pay.

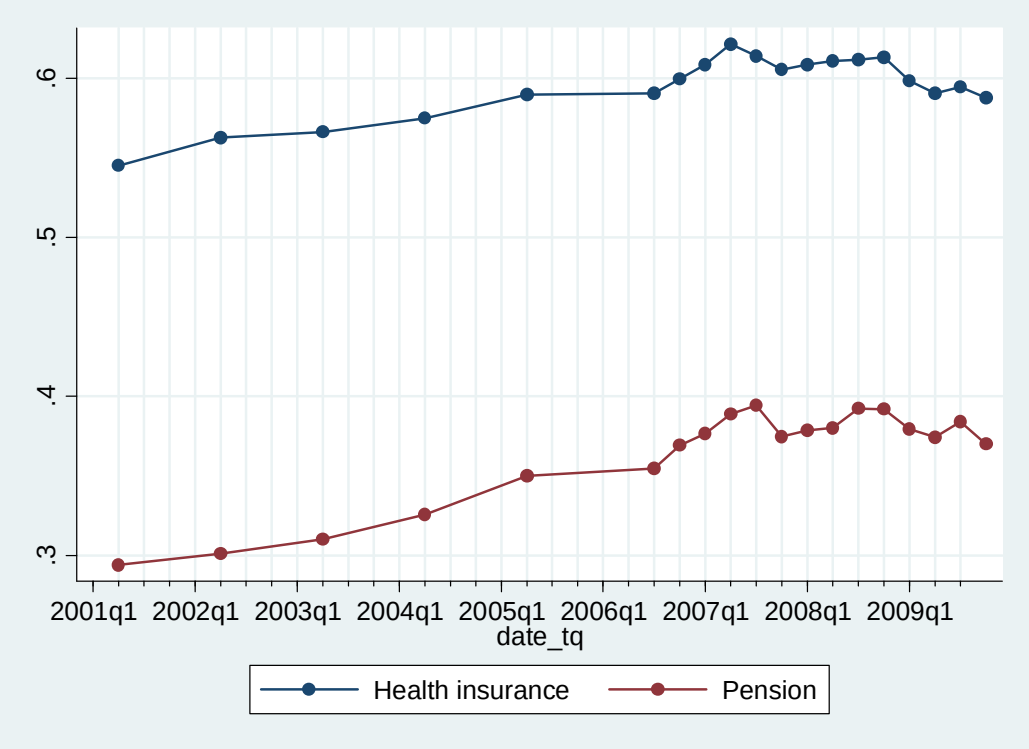
Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Figure 1: the evolution of full formality, full informality and partial informality



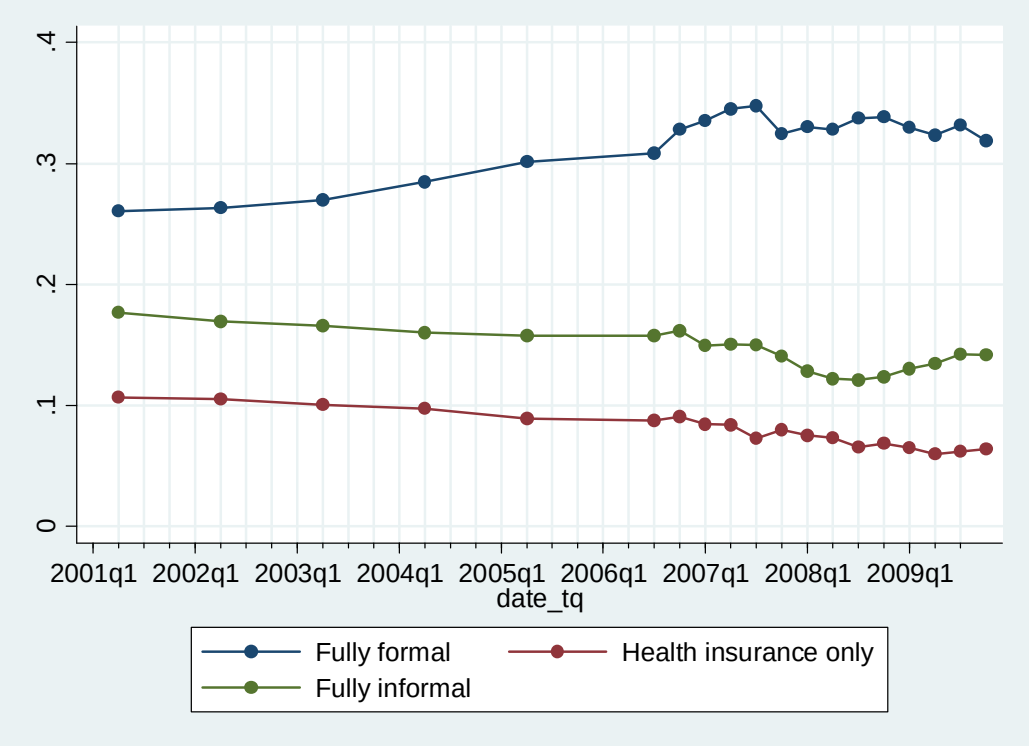
Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Figure 2: the evolution of health insurance and pension coverage



Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

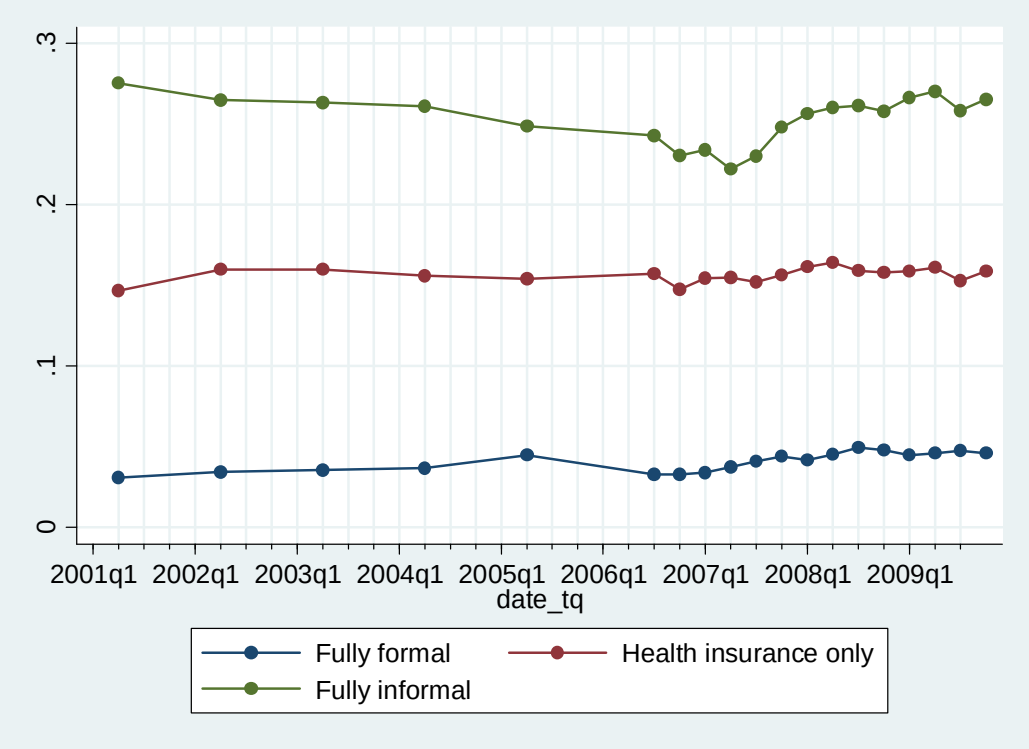
Figure 3: the evolution of full formality, full informality, and health insurance only status among salaried workers



Note : Percentages are expressed as a share of the total workforce.

Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

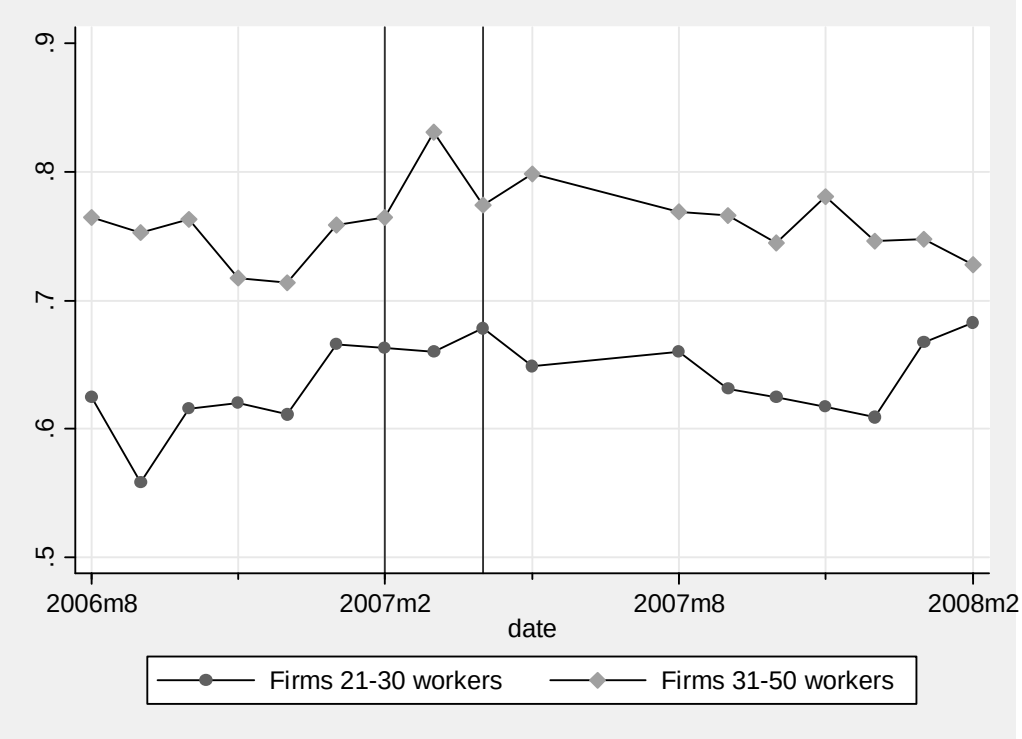
Figure 4: the evolution of full formality, full informality, and health insurance only status among independent workers



Note : Percentages are expressed as a share of the total workforce.

Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) b2006-2009.

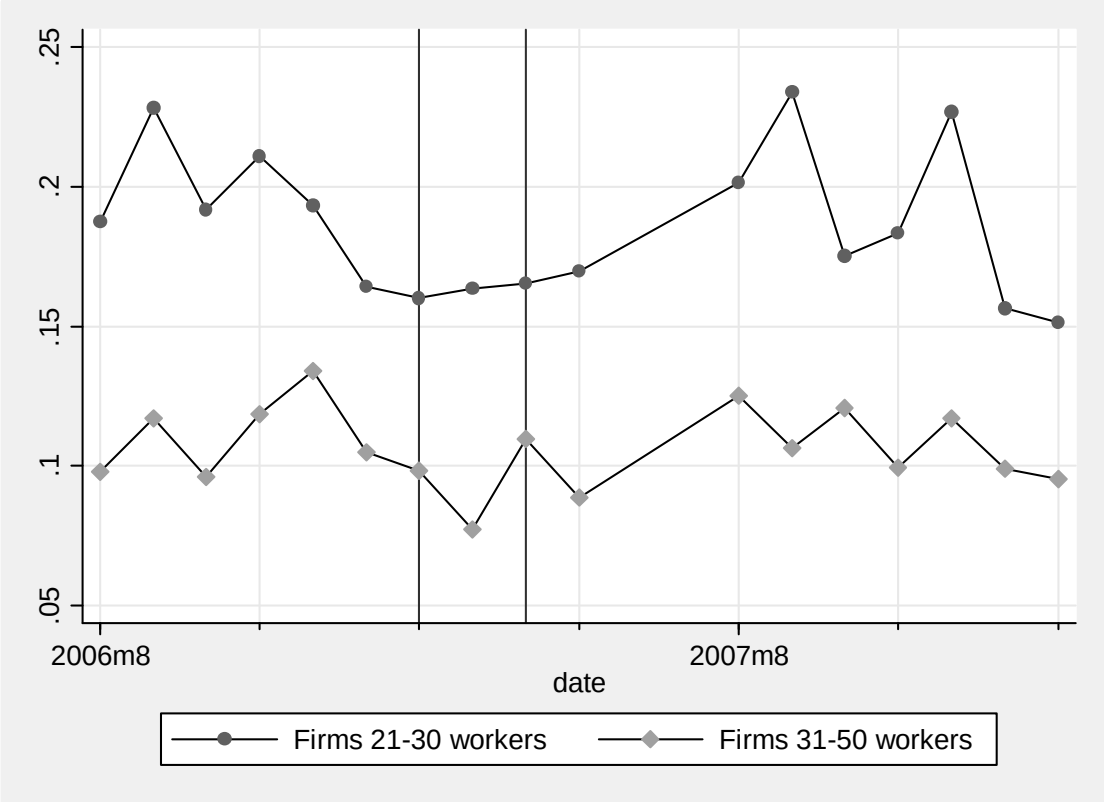
Figure 5: The evolution of full formality in medium firms



Note : Percentages are expressed as a share of the total workforce. The vertical lines express the month on which the reform took place for each firm size.

Source: Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Figure 6: The evolution of full informality in medium firms



Note : Percentages are expressed as a share of the total workforce. The vertical lines express the month on which the reform took place for each firm size.

Source: Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Table 2: the impact of the reforms on full formality and full informality

	Fully Formal			Fully Informal		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Unification	0.00561	0.00978**	0.03089***	0.01593***	0.00795*	0.00027
	[0.005]	[0.004]	[0.005]	[0.005]	[0.004]	[0.005]
Unification* Independent			-0.04714***			0.01714***
			[0.002]			[0.002]
Unification: base income for independents	-0.06601***	-0.06154***	-0.03085***	0.00736**	0.00100	-0.01016***
	[0.002]	[0.002]	[0.003]	[0.003]	[0.003]	[0.003]
2 to 5 workers	0.03341***	0.00906***	0.00942***	-0.10597***	-0.07675***	-0.07689***
	[0.001]	[0.001]	[0.001]	[0.002]	[0.002]	[0.002]
6 to 10 workers	0.21190***	0.16539***	0.16642***	-0.26725***	-0.20580***	-0.20618***
	[0.002]	[0.002]	[0.002]	[0.003]	[0.003]	[0.003]
11 or more workers	0.63795***	0.53895***	0.53853***	-0.56250***	-0.41170***	-0.41154***
	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Independent	-0.06275***	-0.11028***	-0.11016***	-0.05190***	0.02710***	0.02705***
	[0.002]	[0.002]	[0.002]	[0.003]	[0.003]	[0.003]
Schooling		0.01876***	0.01875***		-0.03434***	-0.03434***
		[0.000]	[0.000]		[0.000]	[0.000]
Age		0.01868***	0.01867***		-0.01169***	-0.01169***
		[0.000]	[0.000]		[0.000]	[0.000]
Age squared		-0.00019***	-0.00019***		0.00005***	0.00005***
		[0.000]	[0.000]		[0.000]	[0.000]
Number of children		-0.00932***	-0.00928***		0.01398***	0.01396***
		[0.000]	[0.000]		[0.000]	[0.000]
Female		-0.01843***	-0.01847***		-0.03876***	-0.03875***
		[0.001]	[0.001]		[0.001]	[0.001]
Married and cohabitating		0.00372***	0.00224***		-0.03308***	-0.03254***
		[0.001]	[0.001]		[0.001]	[0.001]
Observations	687,364	686,219	686,219	687,364	686,219	686,219
R-squared	0.515	0.549	0.549	0.266	0.360	0.360

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note: Fully formal means contributing to both health insurance and pensions, while fully informal means contributing to neither. All columns control for month and municipality fixed effects.

Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Table 3: the impact of the reforms on health insurance and pension coverage

	Health Insurance			Pension		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Unification	-0.01804***	-0.01007**	-0.00326	0.00760*	0.01181***	0.03363***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.004]	[0.005]
Unification* Independent			-0.01522***			-0.04870***
			[0.002]			[0.002]
Unification: base income for independents	-0.00557*	0.00088	0.01079***	-0.06797***	-0.06355***	-0.03184***
	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.003]
2 to 5 workers	0.10649***	0.07702***	0.07713***	0.03305***	0.00892***	0.00929***
	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]
6 to 10 workers	0.26663***	0.20455***	0.20488***	0.21266***	0.16676***	0.16781***
	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]
11 or more workers	0.56286***	0.41108***	0.41094***	0.63774***	0.53968***	0.53924***
	[0.002]	[0.002]	[0.002]	[0.001]	[0.002]	[0.002]
Independent	0.04911***	-0.02906***	-0.02902***	-0.05989***	-0.10828***	-0.10816***
	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]
Schooling		0.03463***	0.03463***		0.01847***	0.01846***
		[0.000]	[0.000]		[0.000]	[0.000]
Age		0.01137***	0.01137***		0.01900***	0.01899***
		[0.000]	[0.000]		[0.000]	[0.000]
Age squared		-0.00005***	-0.00005***		-0.00019***	-0.00019***
		[0.000]	[0.000]		[0.000]	[0.000]
Number of children		-0.01411***	-0.01409***		-0.00921***	-0.00916***
		[0.000]	[0.000]		[0.000]	[0.000]
Female		0.04004***	0.04003***		-0.01970***	-0.01974***
		[0.001]	[0.001]		[0.001]	[0.001]
Married and cohabitating		0.03336***	0.03288***		0.00343***	0.00191**
		[0.001]	[0.001]		[0.001]	[0.001]
Observations	687,271	686,126	686,126	687,271	686,126	686,126
R-squared	0.264	0.359	0.359	0.512	0.545	0.545

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns control for month and municipality fixed effects. The effect of the reform on pensions remains positive and statistically significant after clustering at the firm size.

Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Table 4: the impact of the reforms on health insurance and pension coverage by firm size

	Fully Formal		Fully Informal		Health Insurance		Pension	
	No Controls	Controls	No Controls	Controls	No Controls	Controls	No Controls	Controls
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unification 1 worker	-0.01765***	-0.01983***	0.00866*	0.01269***	-0.00976*	-0.01372***	-0.01656***	-0.01879***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.004]
Unification 2 to 5 worker	-0.00195	0.00178	0.02992***	0.02485***	-0.03153***	-0.02658***	-0.00034	0.00350
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
Unification 6 to 10 workers	0.05355***	0.05778***	0.01929***	0.01130*	-0.02368***	-0.01584**	0.05794***	0.06232***
	[0.007]	[0.006]	[0.007]	[0.006]	[0.007]	[0.006]	[0.007]	[0.006]
Unification 11 and more workers	0.03822***	0.05125***	0.02015***	-0.00527	-0.02441***	0.00090	0.04248***	0.05563***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
Independent	-0.12123***	-0.16499***	-0.04475***	0.02778***	0.04358***	-0.02800***	-0.12006***	-0.16477***
	[0.001]	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]
2 to 5 workers	0.02350***	-0.00469***	-0.11816***	-0.08391***	0.11877***	0.08443***	0.02290***	-0.00522***
	[0.002]	[0.002]	[0.003]	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]
6 to 10 workers	0.16766***	0.11717***	-0.27457***	-0.20714***	0.27563***	0.20780***	0.16660***	0.11651***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
11 workers or more	0.60207***	0.49227***	-0.57181***	-0.40225***	0.57437***	0.40409***	0.59952***	0.49043***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Schooling		0.01871***		-0.03400***		0.03427***		0.01845***
		[0.000]		[0.000]		[0.000]		[0.000]
Age		0.01872***		-0.01183***		0.01152***		0.01902***
		[0.000]		[0.000]		[0.000]		[0.000]
Age squared		-0.00019***		0.00005***		-0.00005***		-0.00019***
		[0.000]		[0.000]		[0.000]		[0.000]
Number of children		-0.00919***		0.01423***		-0.01431***		-0.00912***
		[0.000]		[0.000]		[0.000]		[0.000]
Female		-0.01860***		-0.03842***		0.03969***		-0.01987***
		[0.001]		[0.001]		[0.001]		[0.001]
Married cohabitating		0.00323***		-0.02569***		0.02565***		0.00327***
		[0.001]		[0.001]		[0.001]		[0.001]
Observations	616,770	615,646	616,770	615,646	616,770	615,646	616,770	615,646
R-squared	0.516	0.550	0.267	0.361	0.266	0.359	0.513	0.546

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns control for month and municipality fixed effects. Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Table 5: the impact of the reforms on health insurance and pension coverage by firm size, for medium (50 to 100) and large (100 and more) firms

	Fully Formal		Fully Informal		Health Insurance		Pension	
	No Controls	Controls	No Controls	Controls	No Controls	Controls	No Controls	Controls
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unification	-0.00031	0.00481	-0.00777	-0.00966	0.00619	0.00826	0.00127	0.00621
	[0.013]	[0.013]	[0.009]	[0.009]	[0.010]	[0.009]	[0.013]	[0.012]
Unification*Independent	0.04735**	0.04745**	-0.02349	-0.02427	0.02182	0.02268	0.04902**	0.04904**
	[0.021]	[0.020]	[0.015]	[0.015]	[0.016]	[0.015]	[0.021]	[0.020]
Independent	-0.33845***	-0.33473***	0.12731***	0.13125***	-0.12814***	-0.13262***	-0.33762***	-0.33337***
	[0.020]	[0.019]	[0.015]	[0.015]	[0.015]	[0.015]	[0.020]	[0.019]
50-100 workers	-0.07034***	-0.05621***	0.03931***	0.03038***	-0.04039***	-0.03049***	-0.06926***	-0.05611***
	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]	[0.003]
Schooling		0.01288***		-0.00883***		0.00980***		0.01191***
		[0.000]		[0.000]		[0.000]		[0.000]
Age		0.03678***		-0.00882***		0.00957***		0.03603***
		[0.001]		[0.000]		[0.000]		[0.001]
Age squared		-0.00046***		0.00009***		-0.00010***		-0.00045***
		[0.000]		[0.000]		[0.000]		[0.000]
Number of children		-0.00916***		0.00476***		-0.00593***		-0.00800***
		[0.001]		[0.001]		[0.001]		[0.001]
Female		-0.00967***		0.00280***		-0.00239**		-0.01008***
		[0.002]		[0.001]		[0.001]		[0.002]
Married or cohabitating		0.00269		-0.00206**		0.00237**		0.00238
		[0.002]		[0.001]		[0.001]		[0.002]
Observations	124,589	124,577	124,589	124,577	124,589	124,577	124,589	124,577
R-squared	0.072	0.134	0.031	0.067	0.029	0.068	0.073	0.134

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns control for month and municipality fixed effects.

Source: Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Table 5b: the impact of the reforms on health insurance and pension coverage by firm size, for medium (50 to 100) and large (100 and more) firms separating independents into self employed and employees

	Fully Formal		Fully Informal		Health Insurance		Pension	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unification	-0.00027	0.00501	-0.00735	-0.00936	0.00578	0.00798	0.00130	0.00000
	[0.013]	[0.013]	[0.009]	[0.009]	[0.010]	[0.000]	[0.013]	[0.012]
Self Employed	-0.33856***	-0.33824***	0.12913***	0.13316***	-0.13021***	-0.13477***	-0.33748***	-0.33662***
	[0.020]	[0.019]	[0.015]	[0.015]	[0.016]	[0.015]	[0.020]	[0.019]
Unification* Self Employed	0.04763**	0.04992**	-0.02179	-0.02324	0.02026	0.02184	0.04917**	0.05132**
	[0.021]	[0.020]	[0.016]	[0.015]	[0.016]	[0.016]	[0.021]	[0.020]
Employer	-0.33472***	-0.21998**	0.06995	0.06901	-0.06261	-0.06219	-0.34206***	-0.22680**
	[0.115]	[0.091]	[0.076]	[0.069]	[0.075]	[0.069]	[0.115]	[0.091]
Unification* Employer	0.03849	-0.03564	-0.07223	-0.05182	0.06580	0.04372	0.04492	-0.02753
	[0.119]	[0.095]	[0.076]	[0.070]	[0.076]	[0.070]	[0.119]	[0.095]
50-100 workers	-0.07031***	-0.05644***	0.04001***	0.03100***	-0.04112***	-0.03112***	-0.06920***	-0.05632***
	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]	[0.003]
Schooling		0.01287***		-0.00880***		0.00977***		0.01190***
		[0.000]		[0.000]		[0.000]		[0.000]
Age		0.03683***		-0.00892***		0.00967***		0.03608***
		[0.001]		[0.000]		[0.000]		[0.001]
Age squared		-0.00046***		0.00009***		-0.00010***		-0.00045***
		[0.000]		[0.000]		[0.000]		[0.000]
Number of children		-0.00915***		0.00474***		-0.00591***		-0.00798***
		[0.001]		[0.001]		[0.001]		[0.001]
Female		-0.00955***		0.00252**		-0.00211*		-0.00997***
		[0.002]		[0.001]		[0.001]		[0.002]
Married and cohabitating		0.00268		-0.00207**		0.00238**		0.00237
		[0.002]		[0.001]		[0.001]		[0.002]
Observations	124,589	124,577	124,589	124,577	124,589	124,577	124,589	124,577
R-squared	0.072	0.134	0.032	0.068	0.030	0.068	0.073	0.134

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns control for month and municipality fixed effects.

Source: Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Table 6: the impact of the reforms on health insurance and pension coverage by firm size, for small firms (between 6 and 50 workers)

	Fully Formal		Fully Informal		Health Insurance		Pension	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unification 6 to 10 workers	0.05323***	0.04540***	-0.01913	-0.00981	0.01572	0.00628	0.05665***	0.04893***
	[0.017]	[0.016]	[0.013]	[0.013]	[0.014]	[0.013]	[0.017]	[0.016]
Unification 11 to 19 workers	0.05466***	0.04239**	-0.01725	-0.00388	0.02048	0.00698	0.05144***	0.03928**
	[0.018]	[0.017]	[0.014]	[0.013]	[0.014]	[0.014]	[0.018]	[0.017]
Unificantion 20-30 workers	0.04683***	0.03864**	-0.01606	-0.00674	0.01935	0.01001	0.04354**	0.03538**
	[0.018]	[0.017]	[0.013]	[0.013]	[0.014]	[0.013]	[0.017]	[0.016]
Unification 31-50 workers	0.03255*	0.02751	-0.00480	0.00122	0.00702	0.00096	0.03032*	0.02534
	[0.018]	[0.017]	[0.014]	[0.013]	[0.015]	[0.014]	[0.018]	[0.017]
Independent	-0.28742***	-0.32174***	0.09504***	0.14948***	-0.09221***	-0.14688***	-0.29025***	-0.32434***
	[0.005]	[0.004]	[0.005]	[0.004]	[0.005]	[0.004]	[0.005]	[0.004]
6 to 10 workers	-0.13847***	-0.29154***	0.10518***	0.19253***	-0.10086***	-0.18620***	-0.14278***	-0.29787***
	[0.010]	[0.010]	[0.009]	[0.008]	[0.009]	[0.009]	[0.010]	[0.010]
20 to 30 workers	0.09924***	-0.09215***	-0.07125***	0.05419***	0.06821***	-0.05581***	0.10227***	-0.09053***
	[0.010]	[0.011]	[0.009]	[0.008]	[0.009]	[0.009]	[0.010]	[0.010]
31 to 50 workers	0.21177***	0.17265***	-0.14663***	-0.10661	0.14542***	0.10492***	0.21298***	0.17435***
	[0.012]	[0.011]	[0.009]	[0.009]	[0.010]	[0.009]	[0.011]	[0.011]
Schooling		0.03425***		-0.03676***		0.03730***		0.03371***
		[0.000]		[0.000]		[0.000]		[0.000]
Age		0.03963***		-0.02201***		0.02198***		0.03966***
		[0.001]		[0.001]		[0.001]		[0.001]
Age squared		-0.00044***		0.00018***		-0.00018***		-0.00044***
		[0.000]		[0.000]		[0.000]		[0.000]
Number of children		-0.01072***		0.01553***		-0.01642***		-0.00983***
		[0.001]		[0.001]		[0.001]		[0.001]
Female		-0.03191***		0.00650**		-0.00667**		-0.03174***
		[0.003]		[0.003]		[0.003]		[0.003]
Married or cohabitating		0.00007		-0.01350***		0.01395***		-0.00038
		[0.003]		[0.003]		[0.003]		[0.003]
Observations	80,874	80,851	80,874	80,851	80,874	80,851	80,874	80,851
R-squared	0.161	0.254	0.101	0.225	0.097	0.222	0.164	0.256

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns control for month and municipality fixed effects.

Source: Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Table 6b: the impact of the reforms on health insurance and pension coverage by firm size, for small firms (between 6 and 50 workers) separating independents into self employed and employers

	Fully Formal		Fully Informal		Health Insurance		Pension	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unification 6 to 10 workers	0.05850***	0.05066***	-0.02286*	-0.01316	0.02008	0.01028	0.06128***	0.05355***
	[0.017]	[0.016]	[0.014]	[0.013]	[0.014]	[0.013]	[0.017]	[0.016]
Unification 11 to 19 workers	0.05791***	0.04568***	-0.01966	-0.00638	0.02333	0.00993	0.05424***	0.04214**
	[0.018]	[0.017]	[0.014]	[0.013]	[0.014]	[0.014]	[0.018]	[0.017]
Unificantion 20-30 workers	0.05043***	0.04176**	-0.01970	-0.00991	0.02337*	0.01355	0.04677***	0.03811**
	[0.018]	[0.017]	[0.013]	[0.013]	[0.014]	[0.013]	[0.017]	[0.016]
Unification 31-50 workers	0.03368*	0.02901*	-0.00500	0.00044	0.00753	0.00205	0.03115*	0.02651
	[0.018]	[0.017]	[0.014]	[0.013]	[0.015]	[0.014]	[0.018]	[0.017]
Self Employed	-0.21957***	-0.11813***	0.34952***	0.21579***	-0.34676***	-0.21181***	-0.22233***	-0.12211***
	[0.021]	[0.021]	[0.022]	[0.020]	[0.022]	[0.020]	[0.021]	[0.021]
Employer	0.12025***	0.21808***	0.14638***	0.00978	-0.15179***	-0.01421	0.12566***	0.22250***
	[0.017]	[0.017]	[0.014]	[0.014]	[0.014]	[0.014]	[0.017]	[0.017]
Unification* Self Employed	-0.04795***	-0.03463**	0.05101***	0.03819**	-0.05782***	-0.04503***	-0.04114***	-0.02779**
	[0.014]	[0.014]	[0.018]	[0.016]	[0.018]	[0.016]	[0.015]	[0.014]
Unification* Employer	-0.01604	-0.02851	-0.01088	-0.00452	0.00879	0.00251	-0.01394	-0.02650
	[0.019]	[0.019]	[0.016]	[0.015]	[0.016]	[0.015]	[0.019]	[0.019]
6 to 10 workers	-0.14485***	-0.29899***	0.11394***	0.20370***	-0.10981***	-0.19763***	-0.14898***	-0.30506***
	[0.010]	[0.010]	[0.009]	[0.008]	[0.009]	[0.009]	[0.010]	[0.010]
20 to 30 workers	-0.21495***	-0.17572***	-0.15094***	-0.11143***	0.14982***	0.10983***	0.21606***	0.17732***
	[0.012]	[0.011]	[0.009]	[0.009]	[0.010]	[0.009]	[0.011]	[0.011]
31 to 50 workers	0.10063***	0.09383***	-0.07305***	-0.05695***	0.07007***	0.05861***	0.10360***	0.09218***
	[0.010]	[0.011]	[0.009]	[0.008]	[0.009]	[0.009]	[0.010]	[0.010]
Schooling		0.03326***		-0.03476***		0.03529***		0.03272***
		[0.000]		[0.000]		[0.000]		[0.000]
Age		0.03957***		-0.02188***		0.02185***		0.03960***
		[0.001]		[0.001]		[0.001]		[0.001]
Age squared		-0.00044***		0.00019***		-0.00019***		-0.00045***
		[0.000]		[0.000]		[0.000]		[0.000]
Number of children		-0.01074***		0.01557***		-0.01647***		-0.00984***
		[0.001]		[0.001]		[0.001]		[0.001]
Female		-0.02814***		-0.00122		0.00106		-0.02799***
		[0.003]		[0.003]		[0.003]		[0.003]
Married and cohabitating		0.00068		-0.01564***		0.01606***		0.00026
		[0.003]		[0.003]		[0.003]		[0.003]
Observations	80,874	80,851	80,874	80,851	80,874	80,851	80,874	80,851
R-squared	0.169	0.256	0.128	0.236	0.124	0.232	0.172	0.258

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns control for month and municipality fixed effects.

Source: Gran Encuesta Integrada de Hogares (GEIH) 2006-2009.

Appendix I

Overview of the Health and Pension Legislation in Colombia

Law 100 of 1993 created the unified social security system in Colombia. The system has four components, pensions, health care, professional risks and complementary social services. The law established competition between the existing pay-as-you-go system (PAYG) handled by the Institute of Social Security (ISS), with private individual savings accounts managed by "Administradoras de Fondos de Pensiones" (AFPs).

For retirement pensions, the contributions are equivalent 10% of the base salary, and an additional 3.5% is added for administration expenses, disability and survival pensions. Employers are responsible for 75% of the contribution, while the workers contribute the remaining 25%. Independent workers are responsible for the 100% of these contributions. All workers earning 4 minimum wages or above contribute with an additional 1% of their base wage that is paid in full by the worker; these contributions are destined to the Solidarity Pension Fund, that subsidizes workers unable to pay in full their contributions. The social security retirement pension is 65% of final average basic pay in the last 10 years, plus increments up to 85% of final average basic pay after 1,400 weeks' contributions. The maximum insured pay is 25 times the legal monthly minimum wage (World Bank Overview of Employee Benefits). Contributions should generate interest equivalent to 110% of the minimum wage. For those contributing for more than 1150 weeks and unable to meet the 110% interest requirement will be subsidized by the national government.

Law 797 of 2003 –

This law made the contributions mandatory for both salaried and independent workers. The law also established that contributions towards health care and pensions for independent workers had to be made over the same base income. Before this law effective March 1 2003, independent workers with higher incomes will make minimum contributions to health care benefits while contributing over a larger base income for pension benefits. This change in the legislation aimed at reducing evasion to the system might have contributed towards the informalization of the economy as getting access to health care using the contributive system effectively became more expensive.

Decrees 1931 of 2006 and 1670 of 2007

In June 2006, the new unified system for the payment of contributions towards social security benefits became mandatory. The new system was introduced with the purpose of reducing tax evasion and elusion from both employers and employees. The system allows the employee to effectively verify whether the employer has made the payments towards pensions, health services and employment risk insurance. Before, the employee was only aware if the payment was effectively made when utilizing any to the health services.

Firms	Date
1.500 or more	**August 1st 2006**
Con 500 -1500	**October 1st 2006**
Con 100 -500	**December 1st 2006**
Con 30 -100	**February 1st 2007**
Less than 30 and all independent workers *	**April 1st 2007**

- Resolutions 0990 and 1155 of 2009

The Ministry of Social Protection, with the Resolutions 0990 and 1155 of 2009, allowed low income independent to make their contributions to health benefits using the unified system (PILA). For these workers the resolutions do not require the payment of pension contributions, but the workers are required to be registered as low income independents as mandated by the decree 3085 of 2007. These workers are known as contributors 41 and 42; the following chart shows the requirements for contributions of health benefits of these workers.

Type of Worker	**Contributions**	**Requirements**	**Base income**
41 Independent worker with no income. Contribution is made by a third party.	Health	To be registered as a low income independent worker	Max. 1 Min Wage
42 Independent worker earning 1 or less than 1 MW. Law 1250 of 2008	Health	To be registered as a low income independent worker	Max. 1 Min Wage