

The impact of Colombia's pension and health insurance systems on informality¹

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Abstract

This paper examines how changes in the legislation governing health and pension benefits that took place between 2003 and 2008 in Colombia affected the informal and formal labor markets. In particular, we examine two major changes in the legislation. First, we look at the effects of imposing the requirement to use the same base income to contribute to both health insurance and pensions for independent workers using a difference-in-differences strategy. We find that this reform decreased full formality and increased the share of workers that contribute to health benefits only. Second, we study the effects of unifying health and pension system payments, which required employers to make contributions to these two plans through a unified payment system, making it more difficult to contribute differently to the one plan versus the other. Given that the unified health and pension contribution system was rolled out progressively between 2006 and 2007 as a function of firm size, we are again able to estimate the effects of these reforms using a difference-in-differences strategy where firms of different sizes constitute different treatment groups. Our results suggest that this reform increased both full formality and full informality, but with larger positive effects on full formality. Indeed, before the reform, some worker-firms pairs have chosen to contribute only to the health insurance scheme, but after the reforms they sorted in the full formal or full informal sector.

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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 2008 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, as a result 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% to pensions only, suggesting 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 0.6 percentage point, without decreasing the coverage of the health insurance system. However, full informality also increased slightly, and this increase was fully concentrated among independent workers. Thus, the reform achieved its aim of increasing the coverage of the pension and health system in the overall population, even though there was also 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 effect of the unification of the base income for independents' health insurance and pensions is not as 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 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 number of workers contributing to both pensions and health insurance increased after the unification of payments was introduced the base income reported to make these contributions might have declined, even for those workers contributing to both of these benefits before the reform. If this is the case, the unification might have detrimental fiscal effects, as individuals report a lower base income to attain these benefits. 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, but these effects can potentially be sizeable.

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.

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 the labor market outcomes. In the third section, an overview the different reforms that took place between 2003 and 2008 and how we predict these changes 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 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

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

⁴ Loayza, Servén and Sugawara (2009), page 16.

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 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, and will now contribute over a lower base income. In practice we observe that some of the high skilled workers also contribute only to health benefits even after the unification.

⁵ Plan Obligatorio de Salud (POS).

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, independent without contract, or independent with fixed term contract (contratistas). We expect that these different kinds of workers get affected differently by the reforms, and to have different levels of compliance with the new regulations.

We start by defining how the percentage of monthly income that represents the costs of these benefits. 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

1a. All 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 pensions' contributions, since health insurance benefits were not tied to the amount of the contributions, while pension benefits were 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 make it impossible to contribute only to one of the systems. As a result, one may expect some independent workers who previously were only contributing to one of the systems to drop all coverage, and so informality should increase.

1b. Independent workers with contract work

January 9th 2007: firms who hire contract workers are allowed to deduct health contributions. This should increase health coverage for contract workers. But it is not clear how much of an effect the law could have given that firms who hire contract workers do not **have to** deduct health contributions.

January 21st 2010: firms hiring contract workers are required to check social security contributions. This should increase the share of formal workers among independent contract workers. In addition, this new requirement may affect wages for independent contract workers. This law could also decrease the overall proportion of independent contract workers in favor of salaried formal workers. Indeed, if formal firms are now made responsible for the payment of social security contributions by contract workers, they may prefer instead to hire these workers directly as salaried.

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

For the purpose of the paper 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 the 13 largest metropolitan areas in the country. The data includes individuals between 12 and 65 years old.

Information on 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. These questions allow defining very different groups of workers on these quarters to evaluate the effects of changes of regulations on these separate groups.

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 and independent contract workers. The data allow us to estimate the effects of the different reforms that took place between 2003 and 2008. The next section presents the estimation strategy followed by our estimation results.

VI. 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. 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 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.

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 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. This allows us to track more precisely the timing of the introduction of the reform but it limits the amount of data available for the pre-reform period.

VII. Results

Table 1 shows summary statistics. 35% 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. This graphical analysis thus

suggests that the unified payment system may have increased full formality while having a limited effect on full informality.

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.

Figure 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. Interestingly, the informality of independent workers increased during the roll-out of the unified payment system, 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.

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 1 percentage point, while the unified base income

for independents decreased full formality by 6.2 percentage points. Adding more controls in column 2 does not change these point estimates substantially; the impact of the unification reform is now slightly larger, at 1.5 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 1.5 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 3.4 percentage points, and significantly decreased full formality for independent workers by 1.2 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 informality. In the specification with controls, we find that the unification reform did not significantly increase full informality. There is no significant effect of the unification of the base income for independent workers on full informality in columns 4 and 5. The addition of an interaction between the unification and independent dummies in column 6 shows that full informality for salaried workers was indeed unaffected by unification, while unification significantly increased full informality for independent workers by 1.2 percentage point.

Table 3 shows that, overall, health insurance coverage was not significantly affected by the unification reform (at least when adding controls), nor by the unification of base income for independents (cols. 1 and 2). When adding an interaction between unification and independent in column 3, the results change quite a bit for independent workers. We find that the unification reform significantly decreased health insurance coverage for independent workers by 1.3 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 1.7 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 percentage points, which corresponds to the decline in full formality documented in Table 2. Column 6 shows that pension coverage significantly increased by 3.7 percentage points for salaried workers while it significantly decreased by 1 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.

Table 4 shows the results by firm size, using the whole period of study (2001-2008). The unification appears to have a detrimental effect on full formality for the smaller firms (1 worker), reducing it in 1.5 percentage points, while full informality increases by 0.8 percentage points after the unification. As expected, for firms with one worker, both contributions to health benefits and pensions decline by 0.94 and 1.46 percentage points respectively. 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 an 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 1.66 percentage points. For these firms of 2-5 workers, health contributions decline by 1.84 percentage points, while contributions to pensions increase by 0.89 percentage points. These results are not surprising as we expected a larger number of workers to 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 6.08 percentage points, however full informality does not appear to change. Contributions to health benefits decline by 1.5 percentage points, while contributions to pensions increase by 6.5 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 5.14 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 5.5 percentage points. The results presented in table 4 suggest that workers in smaller firms will most likely drop all coverage and become fully informal, as it is now more expensive jointly contribute for benefits, while workers in larger firms will be more likely to become now fully formal. However, we are not able to test whether the increase in full formality has a positive effect in fiscal terms, 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 table 5 and 6 we restrict the sample to the Gran Encuesta Integrada de Hogares 2006-2008, as the survey allows for a finer classification of firm size. In table 5 we run regressions differentiating firms with 50-100 workers and firms with more than 100 workers. For these firms the effect 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 4.32 percentage points. 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 4.6 percentage points.

Table 6 shows the results for medium size firms (6-50 workers). For all subcategories of firms 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 precisely larger firms are expected to be more compliant with these contributions even before the unification system was implemented.

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; this was mostly achieved through an increase in full informality among independent 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.

The effect of the unification of the base income for independents' health insurance and pensions is not as clear cut. Indeed, even though regressions suggest that this decreased full formality among

independent workers⁶, 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.

VIII. Conclusions

Our results show that these different reforms had a substantial impact over the fully formal and fully informal sectors of the labor market. 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 affected the way workers sorted across the fully formal and fully informal sectors. And contrary to what the papers cited have found, we find that these changes in the regulation have had a large and positive effect on 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 0.6 percentage point, without decreasing the coverage of the health insurance system. However, full informality also increased slightly, and this increase was fully concentrated among independent workers. 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 and health system in the overall population and generating incentives that correct for inefficiencies and free riding in the system. The increase in the share of individuals who contribute to both health and pension benefits constitutes a positive change in a previously significantly flawed system that

⁶ This result holds even if we restrict the sample to firms with 5 employees or less, or if we exclude the period after the introduction of the unified payment system.

had created incentives for non-participation and freeloading. 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.

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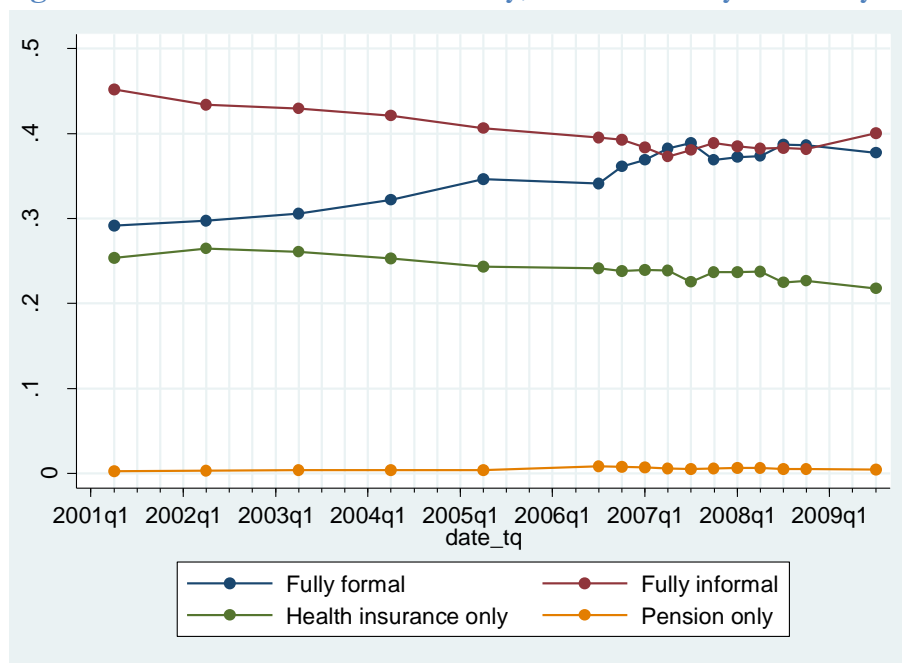
Table 1: Summary statistics

	Obs	Mean	Std. Dev.	Min	Max
Fully formal	600855	0.353809	0.478151	0	1
Fully informal	600855	0.400549	0.49001	0	1
Health insurance	600576	0.59388	0.491108	0	1
Pension	600576	0.359358	0.479813	0	1
1 worker	600855	0.450523	0.497546	0	1
2 to 5 workers	600669	0.367211	0.482045	0	1
6 to 10 workers	600669	0.219437	0.413866	0	1
11 workers or more	600669	0.062887	0.242759	0	1
Independent	600669	0.350466	0.477116	0	1
Schooling	599743	9.326498	4.224848	0	26
Age	600855	38.25912	12.9278	12	99
Number children	600855	1.341089	1.27585	0	14
Female	600855	0.448589	0.49735	0	1
Married or cohabiting	600855	0.56033	0.496347	0	1

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

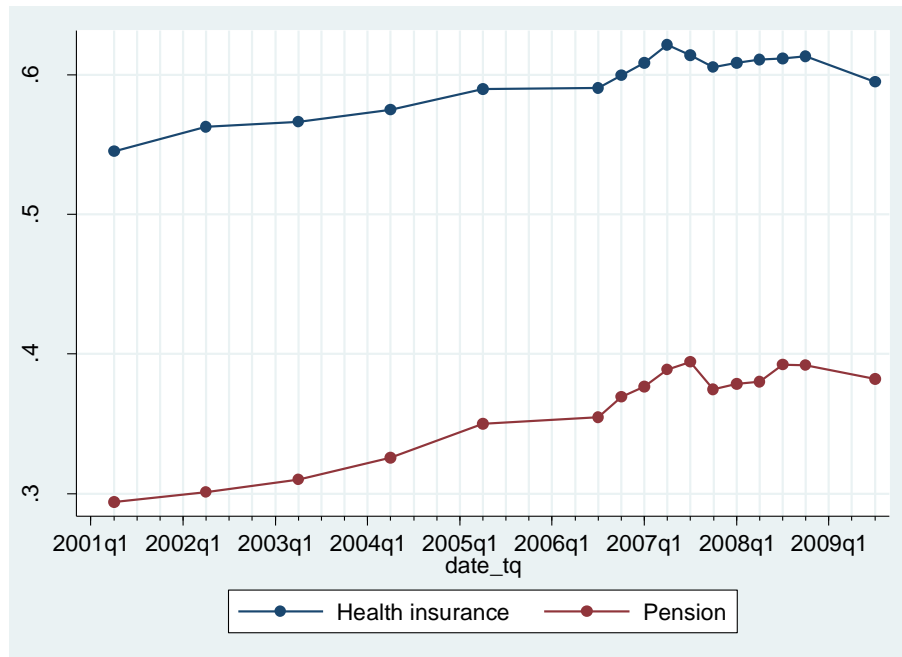
Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2008.

Figure 1: the evolution of full formality, full informality and everything in between



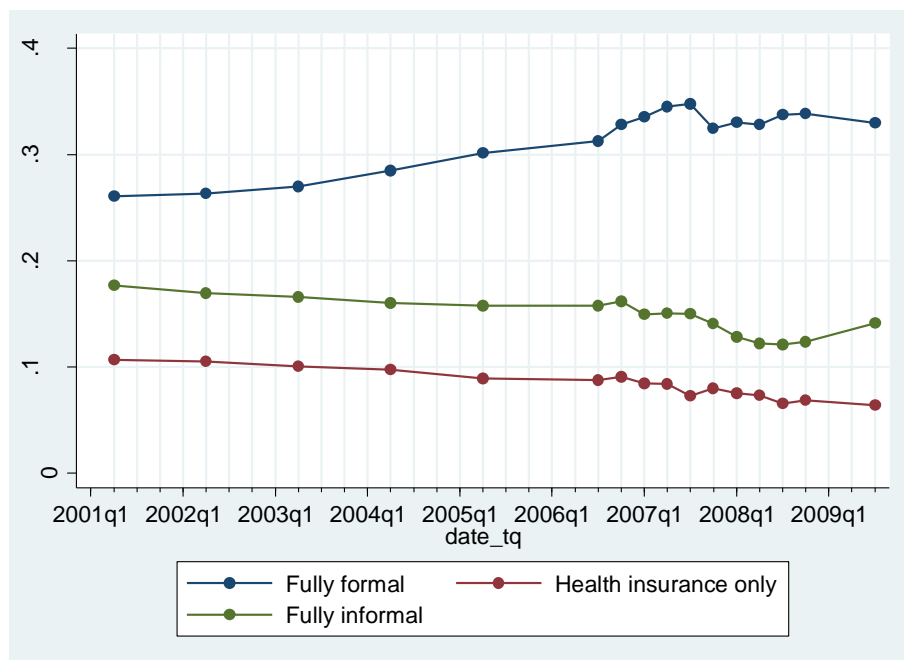
Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2008.

Figure 2: the evolution of health insurance and pension coverage



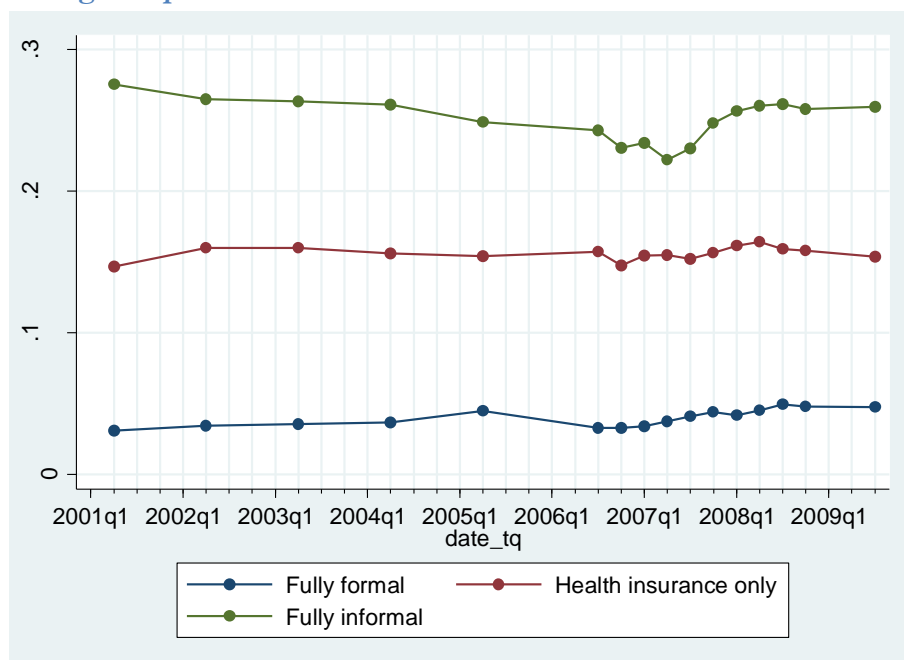
Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2008.

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



Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2008.

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



Source: Encuesta Continua de Hogares (ECH) 2001-2005, and Gran Encuesta Integrada de Hogares (GEIH) 2006-2008.

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

	Fully formal			Fully informal		
	No controls (1)	Controls (2)	Controls (3)	No controls (4)	Controls (5)	Controls (6)
Unification	0.01030** [0.005]	0.01509*** [0.004]	0.03381*** [0.005]	0.01260*** [0.005]	0.00314 [0.004]	-0.00308 [0.005]
Unification*independent			-0.04580*** [0.002]			0.01522*** [0.002]
Unification: base income for independents	-0.06179*** [0.002]	-0.05750*** [0.002]	-0.03086*** [0.003]	0.00523 [0.003]	-0.00161 [0.003]	-0.01046*** [0.003]
2 to 5 workers	0.03478*** [0.001]	0.00973*** [0.001]	0.01018*** [0.001]	-0.11021*** [0.002]	-0.07926*** [0.002]	-0.07941*** [0.002]
6 to 10 workers	0.20980*** [0.003]	0.16178*** [0.003]	0.16295*** [0.003]	-0.27002*** [0.003]	-0.20551*** [0.003]	-0.20590*** [0.003]
11 workers or more	0.63468*** [0.002]	0.53384*** [0.002]	0.53348*** [0.002]	-0.56183*** [0.002]	-0.40789*** [0.002]	-0.40777*** [0.002]
Independent	-0.06474*** [0.002]	-0.11355*** [0.002]	-0.11343*** [0.002]	-0.05163*** [0.003]	0.03102*** [0.003]	0.03098*** [0.003]
Schooling		0.01888*** [0.000]	0.01887*** [0.000]		-0.03407*** [0.000]	-0.03406*** [0.000]
Age		0.01844*** [0.000]	0.01844*** [0.000]		-0.01138*** [0.000]	-0.01138*** [0.000]
Age squared		-0.00018*** [0.000]	-0.00018*** [0.000]		0.00005*** [0.000]	0.00005*** [0.000]
Number children		-0.00929*** [0.000]	-0.00925*** [0.000]		0.01377*** [0.000]	0.01376*** [0.000]
Female		-0.01692*** [0.001]	-0.01696*** [0.001]		-0.04231*** [0.001]	-0.04230*** [0.001]
Married or cohabiting		0.00578*** [0.001]	0.00445*** [0.001]		-0.04917*** [0.001]	-0.04873*** [0.001]
Observations	586,907	585,797	585,797	586,907	585,797	585,797
R-squared	0.509	0.543	0.543	0.263	0.359	0.359
Robust standard errors in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 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) 2006-2008.

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

	Health Insurance			Pension		
	No controls (1)	Controls (2)	Controls (3)	No controls (4)	Controls (5)	Controls (6)
Unification	-0.01484*** [0.005]	-0.00541 [0.005]	0.00008 [0.005]	0.01242*** [0.005]	0.01725*** [0.004]	0.03655*** [0.005]
Unification*independent			-0.01343*** [0.002]			-0.04722*** [0.002]
Unification: base income for independents	-0.00369 [0.003]	0.00325 [0.003]	0.01106*** [0.003]	-0.06354*** [0.003]	-0.05931*** [0.002]	-0.03184*** [0.003]
2 to 5 workers	0.11075*** [0.002]	0.07953*** [0.002]	0.07966*** [0.002]	0.03442*** [0.001]	0.00961*** [0.001]	0.01007*** [0.001]
6 to 10 workers	0.26966*** [0.003]	0.20449*** [0.003]	0.20483*** [0.003]	0.21032*** [0.003]	0.16293*** [0.003]	0.16413*** [0.003]
11 workers or more	0.56230*** [0.002]	0.40737*** [0.002]	0.40726*** [0.002]	0.63439*** [0.002]	0.53448*** [0.002]	0.53411*** [0.002]
Independent	0.04888*** [0.003]	-0.03295*** [0.003]	-0.03292*** [0.003]	-0.06192*** [0.002]	-0.11157*** [0.002]	-0.11145*** [0.002]
Schooling		0.03436*** [0.000]	0.03436*** [0.000]		0.01859*** [0.000]	0.01858*** [0.000]
Age		0.01102*** [0.000]	0.01102*** [0.000]		0.01881*** [0.000]	0.01880*** [0.000]
Age squared		-0.00004*** [0.000]	-0.00004*** [0.000]		-0.00019*** [0.000]	-0.00019*** [0.000]
Number children		-0.01387*** [0.000]	-0.01386*** [0.000]		-0.00921*** [0.000]	-0.00916*** [0.000]
Female		0.04359*** [0.001]	0.04358*** [0.001]		-0.01819*** [0.001]	-0.01823*** [0.001]
Married or cohabiting		0.04961*** [0.001]	0.04922*** [0.001]		0.00534*** [0.001]	0.00396*** [0.001]
Observations	586,814	585,704	585,704	586,814	585,704	585,704
R-squared	0.262	0.357	0.358	0.505	0.539	0.540
Robust standard errors in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 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) 2006-2008.

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
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unification: 1 worker	-0.01330*** [0.005]	-0.01579*** [0.005]	0.00410 [0.005]	0.00829* [0.005]	-0.00530 [0.005]	-0.00941** [0.005]	-0.01210** [0.005]	-0.01467*** [0.005]
Unification: 2 to 5 workers	0.00332 [0.005]	0.00717 [0.005]	0.02188*** [0.005]	0.01664*** [0.005]	-0.02358*** [0.005]	-0.01846*** [0.005]	0.00502 [0.005]	0.00899* [0.005]
Unification: 6 to 10 workers	0.05723*** [0.007]	0.06086*** [0.007]	0.01380** [0.007]	0.00722 [0.006]	-0.01807** [0.007]	-0.01167* [0.007]	0.06149*** [0.007]	0.06530*** [0.007]
Unification: 11 workers and more	0.03825*** [0.005]	0.05145*** [0.005]	0.02026*** [0.005]	-0.00557 [0.005]	-0.02449*** [0.005]	0.00121 [0.005]	0.04249*** [0.005]	0.05580*** [0.005]
Independent	-0.11799*** [0.001]	-0.16341*** [0.001]	-0.04658*** [0.002]	0.02943*** [0.002]	0.04517*** [0.002]	-0.02986*** [0.002]	-0.11658*** [0.001]	-0.16298*** [0.001]
2 to 5 workers	0.02567*** [0.002]	-0.00311* [0.002]	-0.11934*** [0.003]	-0.08388*** [0.003]	0.11987*** [0.003]	0.08433*** [0.003]	0.02513*** [0.002]	-0.00356** [0.002]
6 to 10 workers	0.17063*** [0.004]	0.11912*** [0.004]	-0.27656*** [0.004]	-0.20767*** [0.004]	0.27751*** [0.004]	0.20820*** [0.004]	0.16969*** [0.004]	0.11859*** [0.004]
11 workers or more	0.60484*** [0.002]	0.49369*** [0.002]	-0.57346*** [0.002]	-0.40241*** [0.003]	0.57587*** [0.002]	0.40413*** [0.003]	0.60244*** [0.002]	0.49198*** [0.002]
Schooling		0.01882*** [0.000]		-0.03363*** [0.000]		0.03390*** [0.000]		0.01855*** [0.000]
Age		0.01845*** [0.000]		-0.01165*** [0.000]		0.01130*** [0.000]		0.01879*** [0.000]
Age squared		-0.00018*** [0.000]		0.00005*** [0.000]		-0.00005*** [0.000]		-0.00019*** [0.000]
Number children		-0.00914*** [0.000]		0.01400*** [0.000]		-0.01402*** [0.000]		-0.00912*** [0.000]
Female		-0.01695*** [0.001]		-0.04214*** [0.001]		0.04340*** [0.001]		-0.01821*** [0.001]
Married or cohabiting		0.00531*** [0.001]		-0.04228*** [0.001]		0.04236*** [0.001]		0.00524*** [0.001]
Observations	516,313	515,224	516,313	515,224	516,313	515,224	516,313	515,224
R-squared	0.509	0.544	0.265	0.359	0.264	0.358	0.505	0.540

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 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) 2006-2008.

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
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unification	0.00128 [0.013]	0.00505 [0.013]	-0.00959 [0.009]	-0.01083 [0.009]	0.00820 [0.010]	0.00957 [0.009]	0.00267 [0.013]	0.00631 [0.012]
Unification*independent	0.04326** [0.021]	0.04320** [0.020]	-0.02219 [0.016]	-0.02294 [0.015]	0.01932 [0.016]	0.02013 [0.015]	0.04613** [0.021]	0.04601** [0.020]
Independent	-0.33817*** [0.020]	-0.33421*** [0.019]	0.12734*** [0.015]	0.13120*** [0.015]	-0.12828*** [0.015]	-0.13267*** [0.015]	-0.33723*** [0.020]	-0.33275*** [0.019]
50 to 100 workers	-0.06946*** [0.004]	-0.05652*** [0.003]	0.03740*** [0.002]		-0.03838*** [0.002]	-0.02901*** [0.002]	-0.06849*** [0.003]	
Schooling		0.01328*** [0.000]		-0.00892*** [0.000]		0.00997*** [0.000]		0.01223*** [0.000]
Age		0.03737*** [0.001]		-0.00905*** [0.000]		0.00981*** [0.000]		0.03660*** [0.001]
Age squared		-0.00047*** [0.000]		0.00010*** [0.000]		-0.00010*** [0.000]		-0.00046*** [0.000]
Number children		-0.00892*** [0.001]		0.00497*** [0.001]		-0.00608*** [0.001]		-0.00781*** [0.001]
Female		-0.00976*** [0.002]		0.00209* [0.001]		-0.00170 [0.001]		-0.01015*** [0.002]
Married or cohabiting		0.00390** [0.002]		-0.00424*** [0.001]		0.00477*** [0.001]		0.00337* [0.002]
Observations	98,452	98,442	98,452	98,442	98,452	98,442	98,452	98,442
R-squared	0.069	0.133	0.031	0.067	0.029	0.068	0.071	0.133
Robust standard errors in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

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

Source: Gran Encuesta Integrada de Hogares (GEIH) 2006-2008.

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	
	No controls	Controls	No controls	Controls	No controls	Controls	No controls	Controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unification: 6 to 10 workers	0.05641*** [0.017]	0.04797*** [0.016]	-0.02483* [0.014]	-0.01508 [0.013]	0.02123 [0.014]	0.01136 [0.013]	0.06001*** [0.017]	0.05170*** [0.016]
Unification: 11 to 19 workers	0.06073*** [0.018]	0.04734*** [0.017]	-0.02163 [0.014]	-0.00759 [0.014]	0.02421* [0.015]	0.01002 [0.014]	0.05815*** [0.018]	0.04492*** [0.017]
Unification: 20 to 30 workers	0.04691*** [0.018]	0.03811** [0.017]	-0.01844 [0.014]	-0.00856 [0.013]	0.02208 [0.014]	0.01218 [0.013]	0.04327** [0.018]	0.03449** [0.017]
Unification: 31 to 50 workers	0.03231* [0.018]	0.02737 [0.017]	-0.00469 [0.014]	0.00139 [0.013]	0.00687 [0.015]	0.00073 [0.014]	0.03013* [0.018]	0.02526 [0.017]
Independent	-0.28669*** [0.005]	-0.31960*** [0.005]	0.10169*** [0.005]	0.15330*** [0.005]	-0.09905*** [0.005]	-0.15090*** [0.005]	-0.28933*** [0.005]	-0.32200*** [0.005]
6 to 10 workers	-0.13869*** [0.010]	-0.11893*** [0.009]	0.10503*** [0.009]	0.08562*** [0.008]	-0.10069*** [0.009]	-0.08094*** [0.008]	-0.14303*** [0.010]	-0.12361*** [0.009]
20 to 30 workers	0.09809*** [0.010]	0.07923*** [0.010]	-0.07036*** [0.009]	-0.05146*** [0.008]	0.06727*** [0.009]	0.04805*** [0.009]	0.10119*** [0.010]	0.08264*** [0.010]
31 to 50 workers	0.21040*** [0.012]	0.17106*** [0.011]	-0.14541*** [0.009]	-0.10537*** [0.009]	0.14418*** [0.010]	0.10360*** [0.009]	0.21164*** [0.011]	0.17283*** [0.011]
Schooling		0.03490*** [0.000]		-0.03696*** [0.000]		0.03755*** [0.000]		0.03430*** [0.000]
Age		0.03914*** [0.001]		-0.02182*** [0.001]		0.02174*** [0.001]		0.03921*** [0.001]
Age squared		-0.00043*** [0.000]		0.00018*** [0.000]		-0.00018*** [0.000]		-0.00044*** [0.000]
Number children		-0.00989*** [0.001]		0.01574*** [0.001]		-0.01674*** [0.001]		-0.00889*** [0.001]
Female		-0.03071*** [0.004]		0.00286 [0.003]		-0.00303 [0.003]		-0.03054*** [0.004]
Married or cohabiting		0.00385 [0.003]		-0.02321*** [0.003]		0.02429*** [0.003]		0.00278 [0.003]
Observations	65,758	65,741	65,758	65,741	65,758	65,741	65,758	65,741
R-squared	0.160	0.255	0.101	0.228	0.097	0.224	0.163	0.256

Robust standard errors in parentheses

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

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

Source: Gran Encuesta Integrada de Hogares (GEIH) 2006-2008.

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 with 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 –

Made contributions towards the system mandatory both for salaried and independent workers. The law also established that contributions towards health care and pensions for independent workers had to be made over the 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

- Decree 129 of January 21, 2010

Independent workers with service contracts are now required to contribute towards the social security system; and the firm or individual hiring workers through this type of contract is now mandated by law to verify whether such contributions are effectively done.

-Law 1122, January 9 of 2007

This law mainly had an impact on independent workers. The new law established that all independent workers are required to contribute to the general social security health care program equivalent to 40% of the value of the contract. The hiring party may discount this directly towards this contribution, and such deduction does not imply a formal labor relationship (for which the employer is partially responsible for the contributions). Furthermore, for contracts with Government agencies, the contributions will be made on the presumption of income in accordance with the economic activity, the region of operation and the stability and seasonality of income. The minimum contribution will be a legal minimum wage, and the maximum 25 legal minimum wages. If contracts are below one minimum wage, then these workers will be exempt of contributions towards the system for a period of 3 years.

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