# Are Informal Workers Compensated for the Lack of Fringe Benefits?
# Free Health Care as an Instrument for Formality

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## Abstract

In Mexico, social security provides a bundle of fringe benefits to formal workers. I estimate the effect social security coverage on the wages of female salaried workers and I use the exogenous availability of free health care implemented in 2001 in Mexico City to overcome the endogeneity that typically contaminates estimates. This policy provides valid instruments because eligibility is not correlated with individual unobserved characteristics affecting wages or benefits. In contrast with previous studies for Mexico and other countries, my results show that social security coverage decreases wages between 16 and 23 percent, which supports the compensating differentials theory.

## 1  Introduction

In developing countries, a substantial fraction of workers have informal jobs, i. e., jobs not covered by health insurance or other fringe benefits mandated by law. The compensating differentials theory predicts that if workers value these benefits then informal workers should get a higher wage than workers in formal or covered jobs to compensate for the lack of benefits (Rosen, 1986). In practice, estimating the tradeoff between wages and benefits typically suffers from endogeneity bias because unobservable worker characteristics are likely to be correlated with both variables. A positive bias would arise if more able workers demand higher wages together with higher fringe benefits. In fact, many studies for the U.S. find positive or insignificant effects of health insurance coverage on wages using both cross section and panel data methods[1]. For the same reason, the empirical literature on the wage differentials between formal and informal sectors in developing countries finds evidence of a positive for-

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[1]Currie and Madrian (1999) survey the literature on the tradeoff between employer-provided health insurance and wages.

mality premium (Funkhouser, 1999; Gong and Van Soest; 2002)[2], even if in some studies this premium is not significant (Pratap and Quintin, 2006)

A potential strategy for estimating the compensating differentials for fringe benefits consistently is to find valid instruments for having those benefits. Olson (2002) estimates the wages foregone for employer-provided health insurance using husband's firm size and union status as variables that influence whether wives working full-time accept or decline health insurance coverage through their own jobs. The author does find evidence of a wage-benefits tradeoff but, as he also discusses, assortative mating could still bias his results.

To overcome endogeneity, this paper estimates the effect of formality, defined as social security coverage, on the wages of female salaried workers using the exogenous availability of free health care and prescription drugs implemented in 2001 in the part of Mexico City that belongs to the state of Distrito Federal (DF). Mexican law requires employers in the private sector to register their employees with Mexican Institute of Social Security (IMSS). Both employer and employee are required to pay contributions to the system, and in return the employee gets a bundle of fringe benefits, including access to public health care and retirement saving, among others. Thus, a difference with previous literature is that I am not able to estimate the compensating differential for a single benefit, but rather for the package of benefits provided by Mexican social security. Nevertheless, because health care is a substantial component of these benefits, the availability of state free health care should decrease the incentives to contribute to the system and make informal or uncovered jobs more attractive to some workers, affecting their choice of sector. This policy provides valid instruments because the only requirements to participate are to be at least 18 years old, which is the legal working age in Mexico, to have at least 3 years of residence in the state and to lack health insurance coverage. Thus, eligibility for the program is not correlated with individual unobserved characteristics that affect both wages and the choice of sector.

I use a sample of female salaried workers with at most high school education from the Mexican Urban Employment Survey (ENEU) for Mexico City, Guadalajara and Monterrey, which are the three largest cities in Mexico. The data covers the period 2000-2004, before and after the policy change. After 2001, free health care was available only to DF residents, and not to individuals living in Guadalajara, Monterrey or the part of Mexico City that belongs to the State of Mexico. Using interactions of DF residence with year dummies as instruments, I estimate a probit for the probability of having a formal job and then estimate

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[2]Studies that do find a negative formal premium usually compare self-employed workers with salaried workers or use a definition of informality based on firm size. These studies classify self-employed, family and domestic workers, as well as salaried workers in firms with five or fewer workers as informal. Independent professionals and salaried workers in firms with more than five employees are considered formal. (Marcoullier et al, 1997). Comparing the earnings of the self-employed, classified as informal, with those of salaried workers is misleading because they could include returns to risk, capital and entrepreneurship. On the other hand, even though firm size and compliance are positively correlated, a definition of informality based on firm size might be picking up the effect of the firm size on wages rather than the effect of informality per se. The positive effect of firm size on wages is well documented in the works of Brown and Medoff (1989), Schmidt and Zimmerman (1991) and Rebitzer and Robinson (1991), among others.

the wage equation using two-stage least squares and the predicted probability as an instrument for formality. I also perform estimations for a subsample of female workers with at most secondary education and for those younger than 30.

My results show that being a DF resident after free health care was implemented has a negative and significant effect on the probability that a female salaried worker has social security coverage in her current job. A woman with at most high school education in DF is 4 to 9.7 percentage points less likely to have a formal job after the policy change. Regarding wages, not controlling for the endogeneity of social security coverage gives rise to a positive formal premium, as in other studies for developing countries. In contrast, my instrumental variables results show that female salaried workers in the formal sector earn between 16 and 23 percent less than similar workers in informal jobs.

Additional empirical checks show that the decrease in the probability of having a formal job in DF cannot be attributed to different trends in economic activity, or in female labor force participation, between cities. Moreover, I find no noticeable changes in the trend of these variables after the policy change in DF. Using supplementary data, I find that after the policy change women in DF have a significantly higher probability of having used health care at least once in a year. Conditioned on having used health services at least once, women in DF also have a significantly lower probability of having used IMSS health services most frequently and a significantly higher probability of having used other public health care. This evidence is consistent with women substituting IMSS health care with free state health care in DF.

The main contribution of this paper is showing that properly controlling for the endogeneity of fringe benefits gives rise to a negative formal premium, which supports the compensating differentials theory. In the Mexican context, this implies that informal salaried workers with low education are not necessarily worse off than their counterparts in the formal sector because they are being compensated for the lack of fringe benefits. This would contradict the view of the informal sector as a "waiting" or relatively disadvantaged sector. My results also add to the recent evidence on worker mobility and transition patterns between sectors, which suggest that the labor market in Mexico is relatively competitive (Maloney, 1999; Levy, 2008).

However, if individuals underestimate the probability of becoming disabled or if they are myopic when making intertemporal decisions, withdrawing from the current social security system could have negative consequences on their welfare in the future. As Levy (2008) points out, transitions between formal and informal employment imply, for example, that individuals are forced to save for retirement only part of their working lives, which undermines the government social objectives. So, even though universal access to health care could have positive effects on health outcomes, especially for individuals not participating in the labor market, my findings also suggest that weakening the link between contributions and benefits could lead to more non-compliance with the current labor and tax laws in Mexico.

This paper is organized as follows. Section 2 describes the Mexican social security system

and the DF program used to obtain valid instruments for the choice of sector. Section 3 presents the empirical strategy for estimating the effect of formality on wages and the instrumental variables procedure used in this paper. Section 4 describes the data and variables used in the estimation. Section 5 discusses the results. Section 6 presents some additional empirical checks and section 7 concludes.

## 2  Background: the Mexican Social Security System and the Free Health Care and Prescription Drugs Program

According to Mexican labor law, employers in the private sector must register their employees with Mexican Institute of Social Security (IMSS)[3]. Both employer and employee are required to pay contributions to the system, and in return the employee gets a blundle of fringe benefits including access to public health care, disability, work-risk and life insurance, retirement saving, child day care and housing loans. Federal employees are covered by a similar but separate system called Health and Social Security Institute for Government Employees (ISSSTE). Finally, a small proportion of salaried workers in the private sector get, in addition to IMSS benefits, other fringes, like private health insurance. As a large literature on informality documents, an important fraction of eligible private sector workers is not covered by IMSS (40 percent in my data).

The Free Health Care and Prescription Drugs Program (PSMMG) is a state program that provides free health care and medications to the population not covered by any type of health insurance in the DF part of Mexico City[4]. The program was created in June 2001. To qualify for the program, an individual must be at least 18 years old, must have at least 3 years of residence in DF, and must not be covered by IMSS, ISSSTE or any other type of health insurance. Individuals must enroll voluntarily to receive benefits and they can do so in any state hospital. No fee is paid for either enrollment or any of the medical services, regardless of the applicant's individual or household income. The program covers also the beneficiary's dependents, like her spouse or partner and her children. The only ways of losing the benefits from the program are by providing false information or getting a job covered by either IMSS or ISSSTE.

The benefits from this program are quite generous. The health services provided for free include vaccines, doctor visits, mental health services, lab services, dental and vision care, among others, and they must be provided in hospitals under the administration of the DF government. The program also provides the prescription drugs required by treatment at no cost to the beneficiary and explicitly includes those for the treatment of HIV[5].

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[3]Unpaid family workers and non-salaried workers, like independent professionals, are not legally forced to register with the Social Security system.

[4]Proper Mexico City is called Distrito Federal (DF), which for government purposes is a state, but the metropolitan area of the city also includes some municipalities belonging to State of Mexico.

[5]Before this program, some free health services were provided by the state hospitals, but they were restricted to emergency care and other 14 basic medical procedures. The patients would pay for medications and for any

Given that health care is a substantial component of the benefits linked to the employee's and employer's contributions to IMSS, the availability of free health care in DF should decrease the incentives to contribute to the social security system, thus decreasing the probability that a given worker has a formal job. The PSMMG provides valid instruments because eligibility for the program is not correlated with individual unobserved characteristics that affect both wages and the choice of sector.

## 3 Estimating the effect of formality on wages

To measure the effect of social social security coverage on the wages of salaried workers, one could estimate the following equation:

$$\log wage = \delta_1 + \alpha_1 formal + X\beta_1 + u_1 \tag{1}$$

where the dependent variable is the logarithm of the hourly wage, $formal$ is a dummy variable equal to one if the worker has social security coverage in her current job and $X$ is a vector of individual characteristics. By assumption, $u_1$ has zero mean and it is not correlated with $X$. However, estimating $\alpha_1$ consistently with OLS is problematic because $u_1$ is potentially correlated with formal. Workers choose whether to have a formal job, and receive the bundle of fringe benefits associated with it, according to their unobservable characteristics, like ability. In fact, if ability is positively correlated with formal, i.e. more able workers earn higher wages and also choose jobs covered by social security, then OLS would tend to overestimate the effect of formality on wages. Most previous work, both on compensating differentials and on the effect of formality on wages, suffers from this endogeneity, especially because in most cases it is very difficult to find instruments that affect the choice of sector or benefits, but not wages directly. Suppose $z$ contains valid instruments for $formal$, that is, $z$ can be properly excluded from equation (1), it is partially correlated with having a formal job and it is not correlated with $u_1$.

An instrumental variables procedure[6] that exploits the binary nature of the endogenous explanatory variable consists in estimating the probability of having a formal job with a probit :

$$\Pr ob(formal = 1|X, z) = \Phi(\delta_2 + X\beta_2 + z\gamma) \tag{2}$$

and then estimating equation (1) by two-stage least squares (2SLS) using the fitted probabilities from (2) as an instrument for $formal$. This IV estimator is consistent and asymptotically normal, and it does not require the probit to be the correct specification for equation (2). The 2SLS standard errors and test statistics are asymptotically valid, and they can be corrected for heteroskedasticity and serial correlation. Without valid instruments that are

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additional care.

[6]The description of the procedure is taken from Wooldridge (2002).

actually excluded from equation (1), identification would rest entirely on the nonlinearity of the probit model. As discussed in the previous section, I use the exogenous availability of free health care in DF after 2001 to generate instruments for *formal*.

# 4 Data and empirical specification

This paper uses quarterly data from Mexico's National Urban Employment Survey (ENEU), which is a panel that covers 38 cities in the country. Each individual is followed for a maximum of five quarters and the information collected refers to the previous week. I use a sample of female salaried workers 18 to 60 years old in the three largest cities in Mexico: Mexico City, Guadalajara and Monterrey. Government workers are excluded from the analysis. My data covers the period 2000-2004. After the second semester of 2001, individuals not covered by social security in DF were eligible for free health care and prescriptions drugs, whereas individuals Guadalajara, Monterrey and the part of Mexico City that belongs to State of Mexico were not. Observations in Guadalajara and Monterrey act as controls because they are in cities similar to DF, but in the northern part of Mexico, and observations in State of Mexico, but still within the metro area of Mexico City, further control for any specific regional effects.

Female workers with relatively low education are more likely to respond to this free health care policy by changing their IMSS coverage for several reasons. First, some of IMSS benefits depend on the accumulated time of enrollment in the system. Women have a higher risk of leaving both formal employment and the labor force due to family reasons, so they have a higher risk of not accumulating enough time to receive these benefits, so they might value them less. Second, workers with high education might not respond to the policy change because for them it is difficult to find suitable jobs in the informal sector, whereas workers with lower educational levels might actually find jobs with similar characteristics in both sectors. In addition, workers with high education can also afford private health insurance, and they might not be willing to substitute between private and public care. In fact, using administrative IMSS records, Levy (2008) finds that low-wage workers enter and exit the formal sector more often than high-wage workers.

I also perform estimations for a subsample of female salaried workers with at most secondary education and for those who are at most 30 years old. Younger workers are relatively healthy, so they might value health benefits less. These workers might also value wages today more than pension benefits tomorrow, because retirement seems farther away for them.

Figure 1 shows the fraction of female salaried workers in my sample who have jobs covered by social security in DF and outside of DF (Guadalajara, Monterrey and the State of Mexico part of Mexico City) during the period 2000-2004. The group of workers living outside of DF has formal participation rates that stayed more or less constant around 60 percent during this period. The fraction of female salaried workers covered by Social Security in DF oscillates

between 55 and 60 percent until the end of 2002. After that, one and a half years after free health care was first announced in DF, the proportion of formal workers in DF falls sharply. This preliminary evidence suggests that free health care availability in DF might have decreased the fraction of female workers with social security coverage. Figure 1 also suggests that the response to the program was not immediate, probably because individuals wait to see how the program actually works before deciding to switch sectors[7].

For my estimations, I calculate real hourly wages in 2002 pesos as monthly labor earnings, divided by the monthly hours worked and the average consumer price index for the corresponding quarter. The independent variables included in the probit and logwage equations are age, years of schooling, number of children younger than 3 years old, children 3-5 years old, and children 5-12 years old, number of adults age 18 and older and number of adults age 70 and older in the household; dummies for married, head of household, firm size, occupation, industry, year, and city. The key independent variable in the logwage regression is $formal$, a dummy equal to one if the individual has IMSS coverage in her current job. The instruments are the interactions of the DF dummy with the year dummies (for instance, $DF \times 2001$), Monterrey is the excluded category and I also control for Guadalajara-year and State of Mexico-year interactions. Because ENEU is a panel, standard errors are clustered at the individual level.

Table 1 shows the mean and standard errors of the variables used in the estimation for female salaried workers in DF, State of Mexico, Guadalajara and Monterrey, before the policy change. In DF, about 57 percent of female salaried workers have IMSS coverage before 2001. Both Guadalajara and Monterrey have a higher fraction of similar workers in covered jobs, but the difference is the largest between Monterrey and DF. The mean hourly wage in DF is 15.96 pesos, which is higher than in State of Mexico, very similar compared to Guadalajara, but lower than in Monterrey (18.15 pesos). Female workers seem to be a little bit older, more likely to be married and to be heads of household in DF than in Guadalajara and Monterrey. Women in DF and State of Mexico seem to be quite similar in those characteristics. About 37 percent of female salaried workers in DF are in firms with 5 employees or less, which is higher than in State of Mexico or Monterrey, but similar that in Guadalajara. Women in the three cities have on average about 9 years of schooling which corresponds to having completed secondary education.

Table 2 shows the results of differences-in-means tests between female workers in DF and outside of DF before the policy change. Although most of the differences are significant, except for the real hourly wage, they are small. Thus, female salaried workers in control cities are not very different, at least in those observed characteristics, from those living in DF. In any case, as described before, I explicitly control for many of these observed characteristics in all my estimations.

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[7]In Mexico, switching between a formal and informal job not necessarily means changing employer. An individual could continue working in her same job, but just drop out of the Social Security system. In my data, I can identify whether workers changed their coverage but not whether they changed jobs.

# 5 Results

Table 3 reports the probit effects of free health care availability in DF on the probability of having a formal job. The top panel shows the results obtained using an after dummy, equal to one after June 2001, and the bottom panel shows the results obtained using city-year interactions. All effects are calculated at the mean of independent variables[8]. The top panel shows that, compared to Monterrey, female salaried workers with at most high school education in DF are 4.7 percentage points less likely to have a formal job after June 2001, and this effect is significant at 1 percent. Female workers with at most secondary education and those younger than 30 are 6.7 and 5.4 percentage points less likely to have a formal job in DF after the policy change. In contrast, the effects for similar workers in Guadalajara and State of Mexico after June 2001 are small and not significant.

The results for the city-year interactions in the bottom panel of Table 3 tell a similar story. The DF-year interactions are all negative and significant at conventional levels after 2001, and they seem to be larger in later years. For female workers with at most high school education being a DF resident in 2001, very shortly after free health care was made available, decreases the probability of having a formal job by 3 percentage points, but being a DF resident in 2002, 2003 and 2004 decreases the probability of having a formal job by 4.3, 9.7 and 9.4 percentage points, respectively. For 2004, this decrease amounts to 16 percent of the probability of having a formal job. A similar pattern is observed for the subsample of women with at most secondary education and women younger than 30 in DF, but some effects are larger in absolute value, especially in 2003 and 2004, as would be expected for working women who are relatively young and have even lower education levels. Female salaried workers with at most secondary education (9 years of schooling) are between 19 and 26 percent less likely to have a formal job if they are in DF in 2003 and 2004. Finally, working women who are younger than 30 are 11 percent less likely to have a formal job in 2003 and 20 percent in 2004. So, the availability of free health care in DF seems to have effectively decreased the probability of having a job covered by social security. Most of the Guadalajara-year and State-of-Mexico-year interactions are small in magnitude and not significant. So, in the years following the policy change in DF, workers in Guadalajara and State of Mexico did not experience a significant city-specific change in the probability of having a formal job compared to those in Monterrey, the excluded category. An exception are the effects for State of Mexico in 2003 and 2004 in the first column, which are negative and significant, but about half the size of those estimated for DF. A possible explanation for this is that some workers living in State of Mexico have the possibility of cheating and participating in the program, even though they are not eligible for it. Excluding the State of Mexico observations from the estimation does not change the main results, but only slightly strengthens the negative effects of being

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[8]These effects are calculated as $[Prob(formal = 1|city = 1, t = 1, \bar{X}) - Prob(formal = 1|city = 1, t = 0, \bar{X})] - [Prob(formal = 1|city = 0, t = 1, \bar{X}) - Prob(formal = 1|city = 0, t = 0, \bar{X})]$ where city={DF, Guadalajara, State of Mexico} and t={after, years 2001-2004}.

in DF after the policy change on the probability of having a formal job[9].

Table 4 shows the effect of formality on wages estimated by pooled OLS, first-differences and by instrumental variables. The first two rows do not control for the endogeneity of sector choice and show that, as obtained by previous work, workers in jobs covered by social security earn about 10 percent more than workers in uncovered jobs. This would contradict the compensating differentials theory because it implies that formal workers receive both higher fringe benefits and higher wages. The third row shows the results from a 2SLS estimation, using the predicted probability of having a formal job for each observation as an instrument for formality. In contrast to the results using pooled OLS and first-differences, the effects of formality on wages estimated by this IV procedure are negative and significant. Social security coverage decreases wages by 22 percent for female salaried workers with at most high school education; by 23 percent for women with at most secondary education and by 16 percent for women younger than 30. The last row in Table 3 shows the first-stage coefficient for the instrument $\hat{P}$, the predicted probability of having a formal job obtained from the probit estimation. As expected, this fitted probability has a positive partial correlation with the endogenous variable and it is significant at 1 percent in all cases.

My findings show that pooled OLS and first-differences suffer from positive endogeneity bias, as would be expected if ability is positively correlated with wages and social security coverage. Once the endogeneity is controlled for, I find that female salaried workers in formal jobs earn between 16 to 23 percent less than women in uncovered or informal jobs, as the compensating differentials theory predicts. Olson (2002) estimates that married women in the U.S. forego approximately between 10 and 20 percent of wages in exchange for employer-provided health insurance. My IV estimates are similar in magnitude, but a key difference is that I cannot separate health insurance from other benefits that formal workers receive by contributing to the Social Security system. Taking this into account, my estimated wage-benefits tradeoff might seem low. However, some of these benefits are provided directly by the government and actual quality of services could lower the worker's valuation of the whole bundle.

Another implication of my results is that female salaried workers with relatively low education are not necessarily worse off in the informal sector than their counterparts in the formal sector, because they are being compensated for the lack of fringe benefits. However, leaving the quality of benefits aside for a moment, informal workers are not being forced to save for retirement and they are also not protected against certain risks, at least not through their jobs. If individuals underestimate the probability of becoming disabled or if they are myopic when making intertemporal decisions, withdrawing from the current social security system could have negative consequences on their welfare in the future. Finally, an increase in informality, due to a weakening of the link between benefits an contributions, could also imply lower tax compliance.

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[9]These results are not shown, but they are available upon request.

# 6    Additional Empirical Checks

First, I check whether different trends in economic activity or female labor force participation between the control cities and DF could explain the sharp decrease in formality observed in DF after 2001. Figure 2 plots the unemployment rate for DF and the control cities from the first quarter of 1993 to the third quarter of 2004[10]. The unemployment rate follows very similar trends in both DF and outside of DF throughout the period, and also after the policy change.

Figure 3 shows the labor force participation for women with at most high school education in and ouside of DF, calculated with my data, from the first quarter of 2000 to the third quarter of 2004. The female labor force participation in both groups move together over time and no drastic change ocurred even after the policy was in place. This is not surprising given that the access to free health care in DF is not conditioned on employment. Both working and non-working women are eligible for the program, so even though informal jobs became more attractive than formal jobs, work did not become more or less attractive in DF.

Thus, I conclude that the sharp decrease in the fraction of female salaried workers in formal jobs after 2001 cannot be explained by differences in the economic activity or female labor force participation between cities.

It is worth mentioning that in 2002 the federal government started Seguro Popular, a program that provides low-cost health care access to the population not insured through their jobs. Unlike PSMMG, this federal program is supposed to charge an annual family fee that increases with household income[11] and, for it to be implemented in a given state, the local government must sign an agreement with the federal government. This parallel program does not contaminate my results because it had not started operating in the states where my control cities are located for most of the period covered by my data[12]. In addition, Seguro Popular had not started operating in DF by 2004, because the state government rejected it[13], even though that would allow covering some of the health expenses with additional federal money[14] and providing services in federal hospitals as well.

To perform some additional checks, I use the Employment and Social Security Supplement

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[10]The unemployment rate data is taken from the Mexican Central Bank (Banco de Mexico, www.banxico.org.mx).

[11]Households in the first two income deciles are not required to pay. The premiums paid by households in higher income deciles range from 64 to 1000 USD per year.

[12]Those states are Jalisco (Guadalajara), State of Mexico and Nuevo Leon (Monterrey). According to the 2004 Seguro Popular Report, Jalisco signed the agreement in December 2003, State of Mexico in January 2004 and Nuevo Leon in June 2004. In that same report, an early trial of the program in five states in 2002 is mentioned and Jalisco is among them. Even though the report provides no details on this trial, I suspect it was very small compared to the later expansion of the program. My results in Table 3 confirm this because I find no significant city-after or city-year effects for Guadalajara.

[13]The DF government rejected Seguro Popular because the PSMMG was already operating and also because it did not agree on charging any premiums or fees for the provision of health services.

[14]The PSMMG is financed with the resources from Branch 33 (Ramo 33) of the Federal Budget, which are resources that the federal government transfers to the state goverments to finance expenditures on education, health, infrastructure and public safety.

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(ENESS) to the ENEU data, collected in 2000 and 2004. This survey has a few more detailed questions on social security coverage, and health care use during the previous year.

First, I separately estimate the probability of having social security coverage in her current job for female salaried workers who are already covered by IMSS as dependents, either as spouse or child of an IMSS holder, and those who are not. In my main estimations in section 5, I do not distinguish between these two groups because I did not want to introduce sample selection biases, but I would expect women who are already covered by IMSS as dependents not to respond to the policy. In fact, I find that living in DF in 2004 has a small and not significant effect on the probability that female salaried workers who are already covered as dependents have IMSS coverage through their own jobs, and a negative and significant effect for those who are not covered as dependents[15].

Using ENESS, I also estimate a probit for having used health care at least once in the previous year, and a multinomial logit for the type of health care most frequently used, conditional on having used health services at least once. The availability of free health care in DF hospitals should have a positive effect on the probability that a given woman uses health care services at least once during the previous year and, if the program effectively decreased the probability of having IMSS coverage, as shown in the previous section, it should also decrease the probability of IMSS being the type of health most frequently used. The first column of Table 5 shows that female salaried workers in DF in 2004, 3 years after the policy started, have a 30 percent (0.199/0.665) higher probability of having used health care services at least once in the last 12 months, whereas the effects for similar workers in Guadalajara and State of Mexico are small and not significant. The last 3 columns of Table 5 show the marginal effects for the multinomial logit on the type of health care most frequently used. Being a DF resident in 2004 has a negative but not significant effect on using private health care. The effects of being in Guadalajara and State of Mexico in 2004 on private health care use are larger, but only significant for Guadalajara, so the program does not seem to have decreased private health care use significantly in DF. As would be expected, being a DF resident in 2004 has a negative effect, significant at 10 percent, on using IMSS services, which is at least 1.6 times the negative, but not significant, effects obtained for Guadalajara and State of Mexico. Finally, being in DF in 2004 has a positive effect, significant at 10 percent, on using other public health care, which excludes ISSSTE, but includes Pemex, military and state health services. The program should increase the use of state health services in DF, because they are free. However, in these data, I cannot separate the use of state health services from the other public health services that are grouped together under this category. The evidence is modest, but it suggests that the policy indeed decreased the use of IMSS and increased the use of other public health care in DF, as would be expected.

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[15] These results are not shown but they are available upon request.

# 7    Conclusions

This paper estimates the effect of formality, defined as social security coverage, on the wages of female salaried workers. I overcome the endogeneity that typically contaminates estimates by using the exogenous availability of free health care and prescription drugs implemented in 2001 in DF. My results show that being a DF resident after free health care was implemented has a negative an significant effect on the probability that a female salaried worker has social security coverage in her current job. A woman with at most high school education in DF is about 16 percent less likely to have a formal job after the policy change. Additional empirical checks show that this effect cannot be attributed to differences in the economic activity or labor force participation trends between DF and other cities unaffected by the policy.

Regarding wages, not controlling for the endogeneity of social security coverage gives rise to a positive formal premium as in other studies for developing countries. In contrast, my instrumental variables results show that female salaried workers in the formal sector earn between 16 to 23 percent less than female workers in jobs not covered by social security.

The main contribution of this paper is showing that workers who receive higher fringe benefits are paid a lower wage, which supports the compensating differentials theory. In the Mexican context, my results also imply that informal salaried workers are not necessarily worse off than their counterparts in the formal sector, because they get less benefits, but also higher wages to compensate for them. However, opting out of social security could make informal workers worse off in the future, because the current system bundles health care with disability insurance and retirement savings, among other benefits. As Levy (2008) points out, transitions between formal and informal employment imply, for example, that individuals are forced to save for retirement only part of their working lives, which undermines the government social objectives. Another implication of my results is that weakening the link between contributions and benefits could go against the efforts of increasing labor law and tax compliance in Mexico.

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## Table 1: Descriptive Statistics for Female Salaried Workers Before the Program

| | All | Metro Area of Mexico City | | Other cities | |
| --- | --- | --- | --- | --- | --- |
| | | DF | State of Mexico | Guadalajara | Monterrey |
| Formal | 0.599 | 0.566 | 0.508 | 0.584 | 0.682 |
| | (0.004) | (0.009) | (0.010) | (0.007) | (0.007) |
| Real hourly wage | 16.305 | 15.968 | 13.930 | 15.921 | 18.149 |
| | (0.163) | (0.265) | (0.282) | (0.203) | (0.418) |
| Age | 30.423 | 32.553 | 31.086 | 29.695 | 29.625 |
| | (0.089) | (0.205) | (0.223) | (0.153) | (0.158) |
| Years of education | 8.996 | 9.092 | 8.834 | 8.814 | 9.225 |
| | (0.022) | (0.053) | (0.061) | (0.037) | (0.034) |
| Married | 0.434 | 0.444 | 0.455 | 0.433 | 0.419 |
| | (0.004) | (0.009) | (0.010) | (0.007) | (0.007) |
| Head | 0.133 | 0.173 | 0.171 | 0.122 | 0.104 |
| | (0.003) | (0.007) | (0.008) | (0.004) | (0.004) |
| Household size | 4.471 | 4.552 | 4.819 | 3.740 | 5.090 |
| | (0.019) | (0.036) | (0.040) | (0.039) | (0.029) |
| Children 0-3 years old in the hh | 0.224 | 0.178 | 0.191 | 0.255 | 0.232 |
| | (0.004) | (0.008) | (0.009) | (0.007) | (0.007) |
| Children 4-5 years old in the hh | 0.241 | 0.215 | 0.217 | 0.274 | 0.232 |
| | (0.004) | (0.009) | (0.010) | (0.007) | (0.007) |
| Children 6-12 years old in the hh | 0.560 | 0.477 | 0.552 | 0.671 | 0.486 |
| | (0.006) | (0.013) | (0.016) | (0.012) | (0.010) |
| Individuals 70+ years old in the hh | 0.089 | 0.115 | 0.076 | 0.059 | 0.113 |
| | (0.003) | (0.007) | (0.006) | (0.003) | (0.005) |
| In firms with less than 5 employees | 0.315 | 0.365 | 0.303 | 0.377 | 0.268 |
| | (0.004) | (0.009) | (0.006) | (0.010) | (0.006) |
| Number of obervations | 15,835 | 2,985 | 2,398 | 5,594 | 4,862 |

Standard errors in parentheses. Sample: Female salaried workers with at most high school education (12 years of schooling). The period before the implementation of free health care in DF is from the 2nd quarter of 2000 to the 2nd quarter of 2001. A woman is considered a formal worker if her job is covered by social security.

## Table 2: Tests for Differences in Means Before the Program

|  | Not DF | DF | Difference |
|---|---|---|---|
| Formal | 0.607 | 0.566 | 0.041*** |
|  | (0.004) | (0.008) | (0.009) |
| Hourly wage | 16.390 | 15.970 | 0.422 |
|  | (0.192) | (0.265) | (0.406) |
| Age | 29.928 | 32.553 | -2.625*** |
|  | (0.099) | (0.205) | (0.228) |
| Years of schooling | 8.973 | 9.092 | -0.119** |
|  | (0.024) | (0.053) | (0.056) |
| Firm less than 5 employees | 0.304 | 0.363 | -0.061*** |
|  | (0.004) | (0.008) | (0.009) |
|  |  |  |  |
| Number of observations | 12,854 | 2,985 |  |

Standard errors in parentheses. Sample: Female salaried workers with at most high school education (12 years of schooling). The period before the implementation of free health care in DF is from the 2nd quarter of 2000 to the 2nd quarter of 2001. Women in Guadalajara, Monterrey and the part of Mexico City that belongs to State of Mexico are grouped together in the "Not DF" category. A woman is considered a formal worker if her job is covered by social security.

## Table 3: Effect of Free Health Care Access on the Probability of Having a Formal Job

| | | At Most High School | At Most Secondary | Younger than 30 |
|---|---|---|---|---|
| **Estimation with after dummy** | | | | |
| DF x After | | -0.047*** | -0.067*** | -0.054** |
| | | (0.018) | (0.021) | (0.021) |
| Guadalajara x After | | -0.0001 | -0.002 | 0.021 |
| | | (0.015) | (0.017) | (0.018) |
| State of Mexico x After | | -0.028 | -0.031 | -0.0002 |
| | | (0.019) | (0.021) | (0.022) |
| **Estimation with year interactions** | | | | |
| **DF x Year** | | | | |
| | 2001 | -0.030 | -0.036 | -0.017 |
| | | (0.026) | (0.032) | (0.029) |
| | 2002 | -0.043* | -0.066** | -0.053* |
| | | (0.024) | (0.030) | (0.032) |
| | 2003 | -0.097*** | -0.137*** | -0.071** |
| | | (0.025) | (0.030) | (0.030) |
| | 2004 | -0.094*** | -0.103*** | -0.125*** |
| | | (0.029) | (0.035) | (0.035) |
| **Guadalaja x Year** | | | | |
| | 2001 | -0.036 | -0.068*** | 0.044 |
| | | (0.023) | (0.027) | (0.027) |
| | 2002 | -0.007 | -0.027 | 0.033 |
| | | (0.021) | (0.025) | (0.025) |
| | 2003 | -0.007 | -0.020 | 0.038 |
| | | (0.022) | (0.025) | (0.025) |
| | 2004 | 0.003 | 0.004 | 0.047 |
| | | (0.024) | (0.028) | (0.029) |
| **State of Mexico x Year** | | | | |
| | 2001 | -0.041 | -0.022 | 0.001 |
| | | (0.026) | (0.032) | (0.030) |
| | 2002 | -0.033 | -0.042 | -0.006 |
| | | (0.027) | (0.030) | (0.020) |
| | 2003 | -0.045** | -0.060 | 0.004 |
| | | (0.026) | (0.030) | (0.031) |
| | 2004 | -0.048** | -0.054 | -0.012 |
| | | (0.031) | (0.036) | (0.038) |
| Proportion in formal job | | 0.587 | 0.524 | 0.643 |
| Number of observations | | 51,858 | 35,608 | 27,651 |

Probit effects calculated as the difference in predicted probabilities Prob(formal=1|city=1, t=1)-Prob(formal=1|city=1, t=0)-(Prob(formal=1|city=0, t=1)-Prob(formal=1|city=0, t=0)), where city=(DF, Guadalajara, State of Mexico) and t=(after, years 2001-2004) at the mean of independent variables. Standard errors clustered at the individual level are reported in parentheses. Sample: Female salaried workers with at most high school education (12 years of schooling). A woman is considered a formal worker if her job is covered by social security. All estimations control for age education, number of children of different ages in the household, number of individuals at least 12 years old in the household, number of individuals at least 70 years old in the household and dummies for married, firm size, head of the household, occupation, industry and years. The omitted category for city is Monterrey and the base year is 2000.

## Table 4: Effect of Formality on Log Wages

|  | At Most High School | At Most Secondary | Younger than 30 |
|---|---|---|---|
| **Pooled OLS** |  |  |  |
| Formal | 0.109*** | 0.114*** | 0.091*** |
|  | (0.008) | (0.009) | (0.009) |
| **First-Differences** |  |  |  |
| Formal | 0.100*** | 0.093*** | 0.099*** |
|  | (0.010) | (0.011) | (0.011) |
| **Instrumental Variables** |  |  |  |
| Formal | -0.222*** | -0.228* | -0.159** |
|  | (0.084) | (0.132) | (0.075) |
| First-stage coefficient on fitted probability | 0.908*** | 0.744*** | 1.046*** |
|  | (0.049) | (0.066) | (0.049) |

Standard errors clustered at the individual level are reported in parentheses. Sample: Female salaried workers with at most high school education (12 years of schooling). Secondary education is equivalent to 9 years of schooling. Formal is a dummy variable equal to 1 if the woman has a job covered by social security. All estimations control for age education, number of children of different ages in the household, number of individuals at least 12 years old in the household, number of individuals at least 70 years old in the household and dummies for married, firm size, head of the household, occupation, industry and years. For the IV estimation, fitted probabilities from a probit on the probability of having a formal job are used as an instrument for formal in a 2SLS procedure.

Table 5: Use of health care services

| | Probit for health care use | Multinomial Logit for type of health care most frequently used in last 12 months | | |
|---|---|---|---|---|
| | At least once in last 12 months | Private | IMSS | Other public health care |
| 2004 | -0.116* | 0.033 | 0.063 | -0.096 |
| | (0.067) | (0.085) | (0.087) | (0.067) |
| Guadalajara | -0.011 | 0.130** | -0.081 | -0.049 |
| | (0.044) | (0.054) | (0.053) | (0.034) |
| Guadalajara x 2004 | 0.049 | -0.186** | -0.088 | 0.204 |
| | (0.067) | (0.079) | (0.122) | (0.161) |
| State of Mexico | -0.110** | 0.016 | -0.057 | 0.041 |
| | (0.050) | (0.064) | (0.062) | (0.048) |
| State of Mexico x 2004 | 0.097 | -0.129 | -0.103 | 0.212 |
| | (0.074) | (0.108) | (0.130) | (0.177) |
| DF | -0.125*** | 0.051 | -0.095 | 0.044 |
| | (0.046) | (0.059) | (0.058) | (0.042) |
| DF x 2004 | 0.199*** | -0.104 | -0.165* | 0.270* |
| | (0.058) | (0.103) | (0.091) | (0.154) |
| Sample probability Y=1 | 0.665 | 0.371 | 0.487 | 0.142 |

Probit and multinomial logit marginal effects are calculated at the mean of the independent variables. Standard errors clustered at the individual level are reported in parentheses. Sample: Female salaried workers with at most high school education from ENESS supplement for 2000 and 2004. All estimations control for age education, number of children of different ages in the household, number of individuals at least 12 years old in the household, number of individuals at least 70 years old in the household and dummies for married, firm size, head of the household, occupation, industry and years.
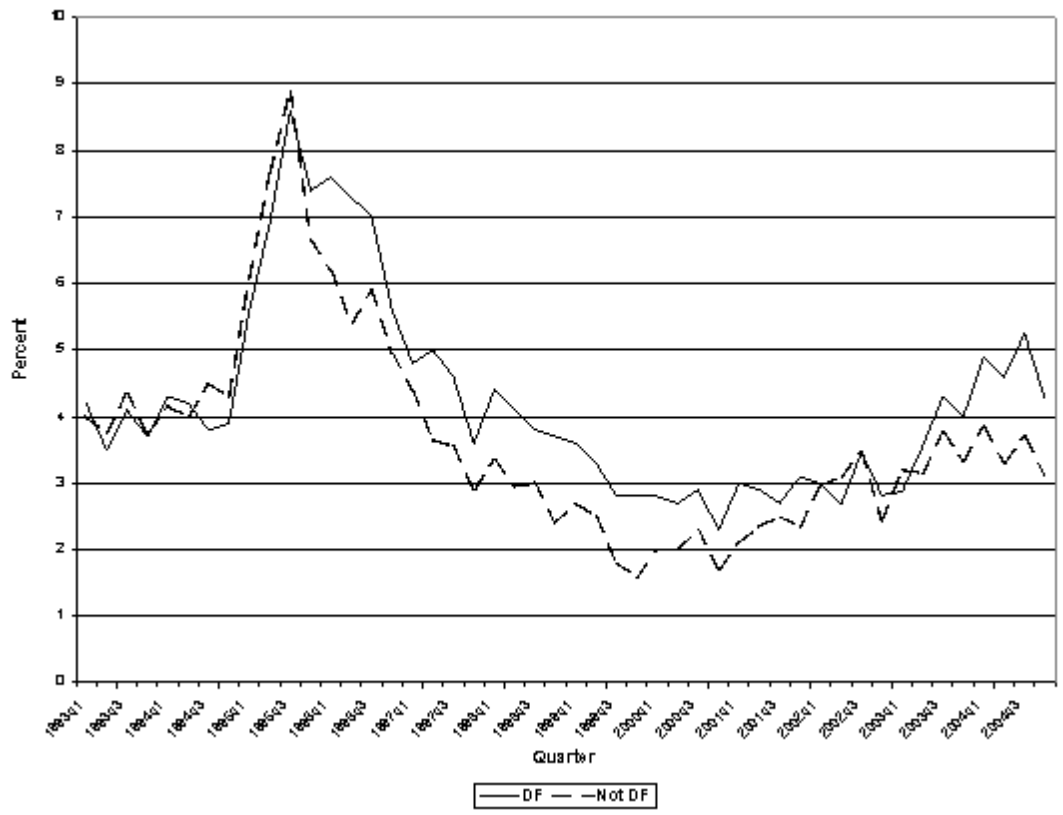
Figure 1



Fraction of Female Salaried Workers Covered by Social Security
With at Most High School Education
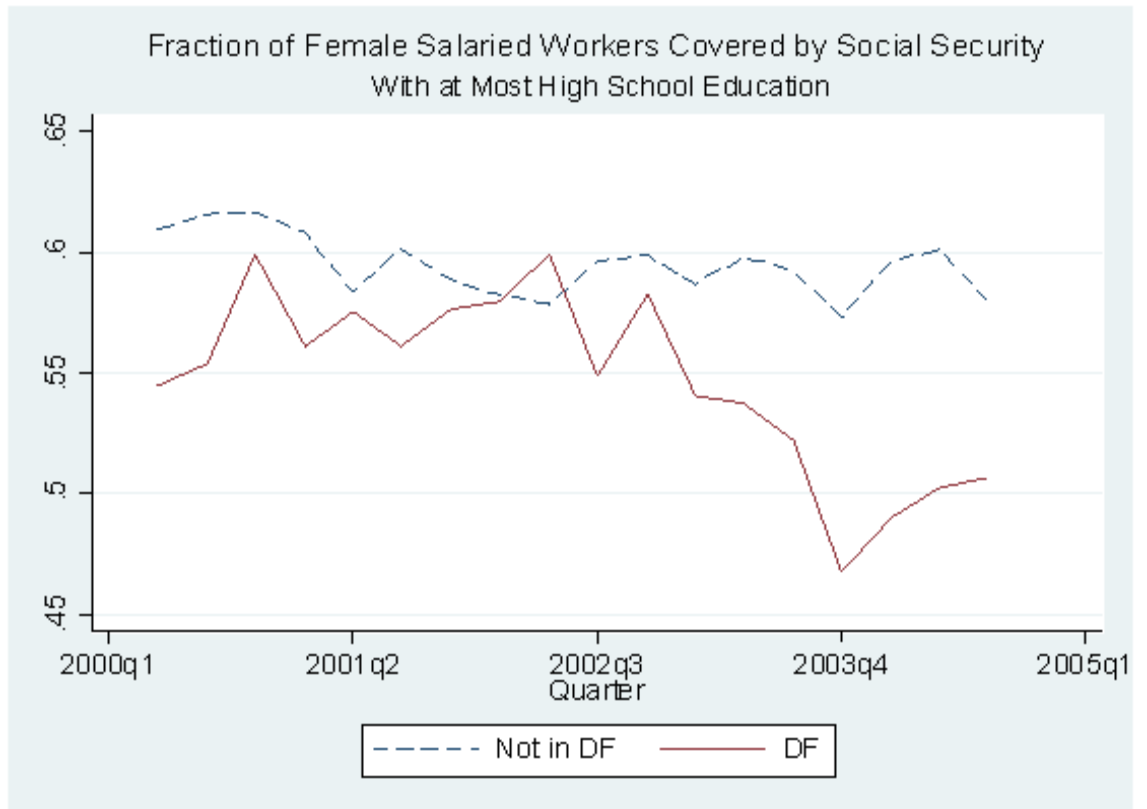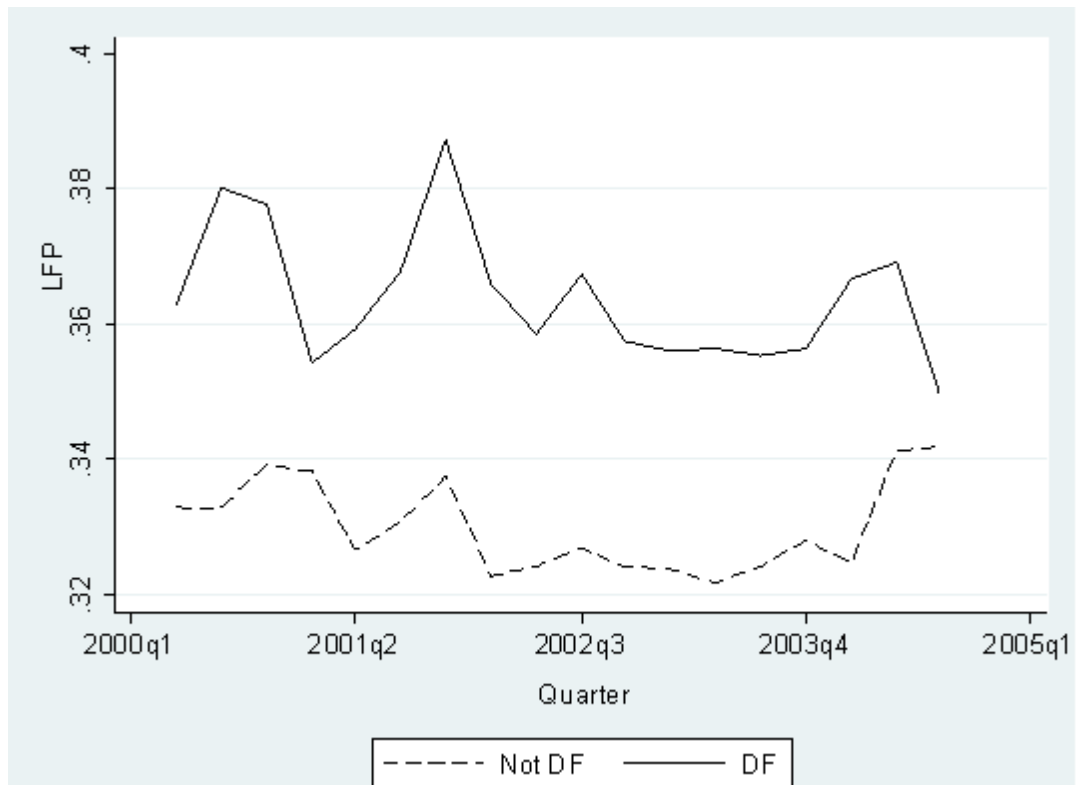
Figure 2: Unemployment Rate

1

Figure 3: Labor force participation of women with at most high school
education