THE IMPACT OF MINIMUM WAGES ON WAGES, WORK AND POVERTY IN NICARAGUA

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Abstract

In this paper we use an individual- and household-level panel data set to study the impact of changes in legal minimum wages on a host of labor market outcomes: a) wages and employment, b) transitions of workers across jobs (in the covered and uncovered sectors) and employment status (unemployment and out of the labor force), and c) transitions into and out of poverty. We find that changes in the legal minimum wage affect only those workers whose initial wage (before the change in minimum wages) is close to the minimum: i.e., increases in the legal minimum wage lead to significant increases in the wages and decreases in employment of private covered sector workers who have wages within 20% of the minimum wage before the change, but have no significant impact on wages in other parts of the distribution. The estimates from the employment transition equations suggest that the decrease in covered private sector employment is due to a combination of layoffs and reductions in hiring. Most workers who lose their jobs in the covered private sector as a result of higher legal minimum wages leave the labor force or go into unpaid family work; a smaller proportion find work in the public sector. We find no evidence that these workers become unemployed.

Our analysis of the relationship between the minimum wage and household income finds: a) the minimum wage is set fairly low relative to the poverty line; it is above the per capita extreme poverty line but below the poverty line for one individual and substantially below the poverty line for a family with more than one member, (b) increases in legal minimum wages increase the probability that a poor worker's family will move out of poverty, and c) increases in legal minimum wages are more likely to reduce the incidence of poverty and improve the transition from poor to non-poor if they impact the head of the household rather than the non-head; this is because the head of the household is less likely than a non-head to lose his/her job from a minimum wage increase and because those heads that do lose their jobs are more likely to go to another paying job than non-heads who lose their jobs from a minimum wage increase (non-heads are more likely to go into unpaid family work or leave the labor force).

1. Introduction

The justification for minimum wage legislation is to redistribute income to low wage workers. This policy tool can be especially important in developing countries during periods of rapid adjustment to the global economy. However, in an era when global competition is very strong, several policy makers are arguing for reductions in (and even the abolition of) minimum wages (and other labor market regulation) in developing countries to allow for more labor market flexibility and increased competitiveness (see e.g., Heckman and Pages, 2003). The main argument is that rigidities in the labor market, such as wage rigidity caused by the minimum wage, can slow down job creation and in turn contribute to unemployment and poverty (see e.g., Pagés and Micco, 2006). On the other hand, fierce competition in the globalized world is also creating an environment that some have termed "the race to the bottom." This group is concerned that wages and working conditions are being driven down by global competition and there is a need to uphold the bottom with regulations such as the minimum wage and labor standards. In fact, Acemoglu (2001) argues that minimum wages can shift the composition of employment toward high-wage jobs. Hence, increases in minimum wages could contribute to the reduction of poverty and inequality by increasing the incomes of those affected by the legislation and perhaps even creating new higher wage jobs.

In this paper we ask about the impact of minimum wages on several outcomes in the labor market. First, we are interested to what extent they raise the wages and whether or not they lower employment of workers in the sector covered by minimum wage legislation. Obviously high wage elasticities with respect to the minimum wage can reduce competitiveness of a nation's workforce in the global economy and hence, can create a reduction in employment from what would exist in a more autarkic economy. Second, we are also interested in studying the dynamics in the labor market resulting from increased minimum wages. To what extent are workers who are forced out of employment in the covered sector likely to move into unemployment v. the non-covered sector? What is the wage impact on workers who move out of the covered sector? To answer these questions, we examine the employment and wage transitions of workers

from the private covered to uncovered sectors and the public sector; and employment transitions across employment status (from employment to unemployment and out of the labor force). The size of these flows will indicate how large of an impact the minimum wage is having as well as the extent to which workers are being made better or worse off. Finally, we are interested in the impact of minimum wage legislation on household income. We ask if it is an effect policy tool for poverty reduction.

We study legal minimum wages in Nicaragua because the country has: (a) a relatively high level of legal minimum wages compared to average wages, which means that minimum wages have the potential to affect a large fraction of the population; (b) substantial variation in minimum wages both between workers and over time which enables us to identify their impact; (c) large proportion of private sector workers not legally covered by minimum wages (the self-employed); and (d) large sector of small firms where employers often avoid minimum wage legislation.

Panel data is essential in order to study these issues because, in addition to allowing us to control for individual-specific fixed effects, it is only with panel data that we can identify employment transitions and changes in the incomes of the same individuals or households both before and after the minimum wage change. The individual-level panel data sets that we use were created for this study from an existing household-level panel data set in Nicaragua. Using personal characteristics of household members, we were able to match the same individuals within households over time.

2. Data

To study the impact of minimum wages on the labor market in Nicaragua, we use annual panel data collected by FIDEG between 1998 and 2006.[1] This data set is based on a 1996 FIDEG household survey of 6,028 dwellings, which is considered to be representative of the population of households in Nicaragua. The households were selected using stratified

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random sampling techniques and information on all the location of all dwellings in each electrical district of the country.[2] The 1998 survey we use is based on a random sub-sample of 1,600 dwellings (816 urban and 784 rural) from the 1996 survey. The principal household in each of these dwellings was interviewed annually between the months of July and September from 1998 to 2006.

Enormous care was taken to track each household and each member of the household over this period. For example, the interviewer first determined if the household was interviewed the previous year or if this was its first interview.[3] The questionnaires had the first and last names of each household member interviewed the previous year, with a designated line item for all years (i.e., that could never be occupied by any other household member). If a member was no longer in the household, questions were asked about that person's location in order to catch migration flows. On the other hand, new household members were designated a line in the questionnaire with explanation about their origin in the household (by marriage, birth, etc.).

Our analytical sample consists of 27,000 observations on 8,682 working age individuals (an average 3.1 observations each). About one-third of the sample has two observations, one-fifth has three observations and 7 percent have nine observations. The Appendix Table A1 contains descriptive statistics on our analytical sample.

Given the panel data is based on a small sample, we have checked its representativeness by comparing some basic characteristics of the workforce with those of the Nicaraguan

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[1] FIDEG, Fundación Internacional para el Desafío Económico Global, is an independent public policy research institute in Nicaragua that carries out policy oriented research on Nicaragua's socio-economic development.

[2] The method used was to first randomly select 58 (out of a total of 156) municipalities, based on their share of the total population and fulfilling a quota of 50% urban. Electoral districts within each municipality were then selected randomly and dwellings were then selected randomly within each district. Within each dwelling, the "principal" household (determined by whether they eat from the same pot) was interviewed.

[3] If the original household left the dwelling (e.g., migrated) it was replaced with the new household in the dwelling family with an indication that it was a new household. If the dwelling was destroyed, the dwelling next door was selected with an indication that this was a new dwelling/household.

LSMS survey carried out by the World Bank in 1998 and 2005. We find that the distribution of the economic activity of the workers is quite similar for the two samples in 1998 but there is some divergence in the two 2005 samples as there is a higher share in the tertiary sector in the FIDEG sample. There seems to be a higher share of unpaid family workers in the FIDEG sample and whereas the average incomes look lower, the median incomes are very similar for the two samples. See Appendix Table A2 for further detail.

The second source of data used is the legal minimum wage decrees from the Nicaraguan Ministry of Labor. Nicaragua sets minimum wages for all workers in the private sector for each of twelve industrial sectors, plus separate minimum wages for workers in free-trade zones (special regimes) and in the central and municipal government. During the years for which we have panel data, new minimum wages are set every year except for 1998 and 2000. Table 1 summarizes the changes in the hourly legal minimum wage for the years we analyze. [4]

We assign to each worker in the FIDEG panel data set a minimum wage based on his/her industry of employment. This implies that we cannot assign a minimum wage to workers who are not in the labor force or to those unemployed people who have not worked before. Further, we cannot identify workers in free-trade zones, nor can we distinguish between central and municipal government workers from workers in state-owned firms (for whom the private sector minimum wage applies), therefore we assign to these workers the minimum wage that is applicable to the private sector industry in which they work. We assign to full-time workers (working 40 or more hours a week) a monthly and hourly minimum wage (calculated as indicated in the previous footnote) and to part-time workers only an hourly minimum wage.

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[4] Legal minimum wages in Nicaragua are published as monthly earnings for full-time workers and as hourly and daily wages for part-time workers. The daily wage is calculated by the Ministry of Labor as the monthly minimum wage divided by 30.4. The Labor Code considers holidays and Sundays to be working days, hence 30.4 is the average number of formal working days per month. The hourly minimum wage is then calculated as the daily wage divided by 8.

We find that the minimum wage is high relative to the mean and median wages of private sector workers during this period. The ratio of the mean minimum wage to the mean wage is 0.53 and the ratio to the median wage is 0.81. The trend over this period is fairly constant, with dips in 1998 and 2000, when the minimum wage was not changed.

3. Compliance Issues

The law decrees that all private and public sector employees in Nicaragua should be paid a minimum wage. The workers not covered by minimum wage legislation (the uncovered sectors) are the self-employed (who include the owners of small firms) and unpaid family workers. Before examining the impact of minimum wage legislation, it is important to detect the sectors of the labor market where there is compliance with minimum wage legislation. There are several ways in which we check for compliance in the data.

3.1. Comparing the Distribution of Wages and Legal Minimum Wages

A straightforward method is to look for spikes in the wage distribution at or around the minimum wage. Given the multiple minimum wages in the Nicaragua, we simplify the graphical analysis by plotting the kernel density estimate of the log wage minus log minimum wage for each worker. In these figures a zero indicates that the worker is earning the legal minimum wage. To test for different levels of compliance, we construct these figures for five different groups: large firms in the covered private sector, small firms in the covered private sector, the covered public sector, and the uncovered self-employed. The rationale for analyzing three groups in the covered sector separately is to decipher whether the small scale sector complies or not and to distinguish the public sector workers, who tend to have higher wages in most Central American countries.

In constructing the kernel density estimates, for full-time workers we compare monthly earnings to the monthly minimum wage. For part-time workers, we compare the hourly wages to the hourly minimum wage. The kernel density estimates are presented in Figure 1, with the same scale to make comparisons between sectors easier. A value above

(below) zero indicates that those workers earn above (below) the legal minimum wage. These figures suggest that legal minimum wages have some impact in the covered sector and in the public sector. In those two covered sectors we see spikes in the distribution near zero and the distributions show some evidence of censoring below the minimum wage. However, the evidence of censoring is not strong; a large proportion of workers in the covered sectors earn less than that minimum wage. The censoring and spike near zero in the distribution in the covered private sector are more pronounced for large private sector firms than for small covered private sector firms. This might suggest that compliance is greater in large private sector firms than in small private sector firms. In the uncovered self-employed sector there is no evidence of censoring, but there is a set of spikes in the distribution near the minimum wage.

There is a question as to whether Figure 1 is not capturing compliance cleanly because of potential measurement error in the hourly wage and hourly minimum wage variables that we use for part-time workers. (This is because the hourly measures are calculated from monthly measures that are divided by reported number of hours worked, which can have substantial measurement error.) As a result, we also provide kernel density estimates for subsample of full-time workers only in Figure 2. It is clear from these estimates that the findings in Figure 1 hold; they are not sullied by measurement error.

In summary, the kernel density estimates provide some evidence of compliance with minimum wages in the covered sector, especially large firms, in Nicaragua, and non-compliance in the uncovered (self-employed) sector. However, this evidence is not strong.

3.2. Proportion of Workers Earning the Minimum Wage by Sector of Employment
Another way to summarize the information on compliance is to calculate the average share of workers earning less than the minimum wage, near the minimum wage, or more than the minimum wage within each of these four sectors. We use a bound of 20% to allow for measurement error so that we are actually measuring the share earning less than 0.8 of the minimum wage, within 0.8 and 1.2 of the minimum wage and more than 1.2 of

the minimum wage. These data are presented in Table 2, separately for the private covered, public and uncovered self-employed sectors. We also divide the private covered sector into small and large firms.

There is some evidence that compliance is greater in the covered private sector than in the uncovered self-employed sector: while 25.5% of workers in the private covered sector earn within 20% of the minimum wage, only 15.6% of self-employed workers earn within 20% of the minimum wage. While this is evidence that compliance is greater in the covered sector than in the uncovered sector, compliance is far from universal even in the covered sector; it is clear that a significant proportion of workers, even in those sectors legally covered by minimum wages, earn less than the minimum wage: as many as 23% of the workers in the private covered sector. Even in the public sector 4.1% of workers earn less than the legal minimum wage.

Because many are surprised by the number of workers in Nicaragua earning less than the minimum wage, even in the large firm sector, and some surmise that it may be due to measurement error in the hourly wage and minimum wage variables, we also calculate these percentages using monthly wage and minimum wage for the subsample of full-time workers (which account for approximately about 50% of all workers). These percentages in the second panel of Table 2 indicate that similar proportions of covered sector full-time workers earn less than the minimum wage and that the share for full time uncovered self-employed workers is substantially larger than the share for all self-employed workers (including part-time workers).

4. Wage and Disemployment Effects in the Covered Sector
In this section we examine the extent to which increases in the minimum wages raise wages and expel workers from the covered sector, as predicted by the competitive model of the labor market.

4.1 Wage Effects

We next estimate the elasticity of the wage with respect to the minimum wage in the covered sector. Using the panel data set of workers we estimate the following wage equation on all workers who remained in a covered sector job from one year to the next:

$$\Delta \ln W_{it} = \alpha_o + a_1 \Delta \ln MW_{It} + \Delta X'_{it}\beta + a_2 \Delta \ln GDP_{It} + \sum_{t=1}^{T} \gamma_t YR_t + \mu_{it}, \quad (1)$$

where the dependent variable, ΔlnW_{it}, is the change in the log of real wages of individual i between time t and time $t+1$. The explanatory variables include the change in the log of the real minimum wage between time t and time $t+1$ that applies to that worker's industry category in time t, $\Delta lnMW_{it}$. The coefficient α_1 is an estimate of the impact on actual wages of changes in the legal minimum wage. Other explanatory variables include the vector X_{it}, of individual specific human capital variables (years of education and whether the worker lives in an urban area) and the log of real value-added in industry I at time t (lnGDP).[5] Finally, to control for endogenous changes in yearly average minimum wages (as well as other year-specific factors such as aggregate supply and aggregate demand changes, or the timing of minimum wage changes) we include a dummy variable for each year, YR_t.

In addition to estimating the wage equations for individuals who are in the covered sectors at time t and time $t+1$, we also estimate the wage equations for those who remain self-employed from one year to the next as a placebo test. If minimum wages are being enforced in the covered sectors but not the uncovered sector, then changes in the minimum wage should positively affect the wages of those who remain in the covered sector and have no direct effect on those who remain self-employed from t to $t+1$.

Since we expect that legal minimum wages will have a larger impact on the wages of workers who earn near the minimum wage, we also estimate the impact of minimum wages on the wages of workers who were within 20% of the legal minimum wage at time t (before the minimum wage was changed).

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[5] Note that since we are estimating a model based on first-differencing the individual-level data, the characteristics of individuals that do not change over time (such as gender), or change by the

Finally, we estimate equation (1) for the groups mentioned above with the hourly minimum wage and hourly wage data for all workers (both full-time and part-time workers) and also for those workers within 20% of the minimum wage at time t. We also estimate the wage equation using the monthly wage and monthly minimum wage for only full-time workers who were within 20% of the minimum wage at time t, to control for measurement error.

The estimated coefficients for these regressions are reported in Table 3. They can be interpreted as elasticities — the percent change in actual wages given a one percent change in the legal minimum wage – and as evidence for compliance with the minimum wage laws. The estimates of the coefficients on the minimum wage variable do provide evidence that legal minimum wages are complied with in the private covered sector. The coefficients are positive, although only statistically significant only for those workers whose wages were near the minimum wage. We estimate an elasticity of 0.58 for all covered private sector workers whose wages are within 20% of the minimum wage in time t, which rises to 0.65 for full-time covered sector workers whose wages are within 20% of the minimum wage. There is no statistically significant impact of minimum wage changes on the wages of private sector workers whose wages are more than 20% above the minimum wage (not shown in table). The coefficients are positive for both large and small firms and statistically significant for the full-time workers near the minimum. The relative size of these coefficients also indicates that the impact of the minimum wage may be felt more in the large-firm private sector than in the small-firm private sector, although the difference in the coefficients is not statistically significant.

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same amount each year (such as age or experience) are already controlled for and cannot be explicitly included in this regression.

The coefficient on the minimum wage variable in the wage equations for uncovered self-employed workers is never statistically significant, indicating that legal minimum wages are not complied with in this sector. [6]

In summary, the wage equations suggest that minimum wage laws in Nicaragua are complied with in the private covered sector, but do not have a significant impact on the wages of workers in the uncovered self-employment sector.

4.2. Disemployment Effects

We next examine the impact of changes in minimum wages on the employment of workers in the covered sectors. Using the panel data set of workers and binomial probit analysis, we estimate, for all workers who were in the covered private sectors at time t, the following employment equations:

$$Prob(EMP_{it} = 1) = \alpha_o + a_1 \Delta \ln MW_{It} + \Delta X'_{it} \beta + a_2 \Delta \ln GDP_{It} + \sum_{t=1}^{T} \gamma_t YR_t + \mu_{it}, \quad (2)$$

where the dependent variable, *Prob(EMP_{it}=1)* is equal to one if individual *i* remains employed in the covered sector between time *t* and time *t+1*, and zero if individual *i* loses his/her job between time *t* and time *t+1* (and ends up either as a self-employed worker, unpaid family worker, unemployed or out of the labor force). The explanatory variables are the same as those in the wage equation. From the coefficient α_1 we can estimate the impact on the probability that a worker remains employed in the private covered sectors of a change in the legal minimum wage.

Our estimates of the impact of changes in legal minimum wages on the probability that a worker remains in the covered sector are reported in Table 4. A negative number in Table 4 indicates that an increase in minimum wages reduces the probability that a worker keeps their job in the covered sector (that is, a negative number indicates that higher minimum wages increase the probability that a worker will lose their covered

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[6] Since we are unable to assign the correct minimum wage for workers in the FIDEG survey that say they work for the public sector, but do not indicate if they work for a state-owned enterprise or public administration, we have not analyzed the impact of the minimum wage on their wages.

sector job). These results imply that an increase in the legal minimum wage will result in a statistically significant fall in employment in the private covered sector; a 10% increase in the legal minimum wage will result in a decrease in the probability that a worker is found in the private covered sector by 3.1% for all workers, and fall by 5.2% for all workers with wages near the minimum wage, and a similar 5.1% fall in full-time near the minimum. Evaluated at the average proportion of workers in the covered private sector, these results imply that a 10% increase in the legal minimum wage results in an approximately 5% fall in total employment in the covered private sector. We find a statistically significant negative employment impact of increases in minimum wages in both large and small covered private sector firms; although the negative employment impact is larger in large firms, and for small firms it is only negative and significant for all workers with wages near the legal minimum wage.

In summary, our evidence is consistent with the hypothesis that increases in legal minimum wages in Nicaragua result in a decline in employment in the private covered sector, and the decline is larger in the large-firm private sector where wage impact of the minimum wage – i.e., compliance -- is stronger.

5. Dynamic Effects: Employment Transitions

The increase in the minimum wage could decrease employment in the private covered sector either because workers lose their private covered sector jobs and/or because fewer workers are hired into the private covered sector. An original contribution of our work, which is possible because of the panel data that we create, is to trace the impact of minimum wages on employment flows into and out of the covered sector, and from the covered sector into other sectors (e.g., self-employed) and status in the labor market (unemployment and the labor force). In this subsection, we examine whether there is evidence that workers lose their jobs in the private sector, and if so where workers go who leave the private sector because of a minimum wage increase. Moreover, we examine whether an increase in the minimum wage lowers hiring into the covered sector.

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To examine whether higher minimum wages result in more workers leaving the private covered sector, we start with the sample of all workers employed in the private covered sector at time t. We then estimate a multinomial logit model using this sample, where it is possible for workers who start in the private covered sector to be found in one of the following sectors in time t+1: stay in the private covered sector, move to self-employment, move to unpaid family work, move to the public sector, become unemployed or leave the labor force. Specifically, we define a variable, $TRANS_{ikz,t}$, that indicates whether the worker moves from sector k (the private covered sector) into sector z (z= stay in the private covered sector, self-employment, unpaid family work, the public sector, unemployment or leave the labor force). The base category is that a worker stays in the private covered sector. Thus, the probability of individual i leaves the private covered sector (sector k) for sector/state z, conditional on starting in sector k (k = private covered sector, self-employed sector, unpaid family work, the public sector, unemployment or leave the labor force) is characterized by:

$$Prob(TRANS_{ikz,t} = 1) = \exp(\theta_z)/(1 - \exp((\theta_z)))$$ (3)

where

$$\theta_z = \alpha_{oz} + a_{1z}\Delta \ln MW_{It} + \Delta X'_{it}\beta_z + a_{2z}\Delta \ln GDP_{It} + \sum_{t=1}^{T}\gamma_{zt}YR_t + \mu_{ikz,t,}$$

The explanatory variables include the change in the log of real minimum wage that applies to that worker's industry at time t, ΔMW_{it}. The impact of minimum wages on the probability of moving from the private covered sector into sector z is measured using α_{1z}. We calculate the marginal impact of changes in legal minimum wages on the probability that workers leave the private covered sector and go into the public sector, self-employment, unpaid family worker sector, unemployment or leave the labor force. Other explanatory variables are the same as those in the wage and employment equations.

Table 5 presents our estimates of the marginal impact of changes in legal minimum wages on the probability that workers leaves the private covered sector and go into another sector; a positive number in Table 5 means that higher minimum wages increase

the probability that a worker leaves his/her job in the private covered sector and moves to sector z. The results suggest that workers in the covered private sector lose their jobs when minimum wages increase, and that they are most likely to become unpaid family workers. This is a novel and robust result; it is true whether we use the sample all workers, those within 20% of the minimum wage or full-time workers near the minimum wage. The effect is quite large, especially for full-time workers near the minimum wage, where a 1% increase in the minimum wage will increase the probability that a worker moves from the private covered sector to unpaid family work by 0.41 percentage points. Given the mean (unconditional) probability is 4.6%, a 1% increase in the minimum wage will raise the probability to 5.0% (a 9 percent increase). There is some evidence that other workers who leave the private covered sector may leave for a public sector job or leave the labor force; however, there no evidence in Table 5 that workers who lose their jobs in the private covered sector move into self-employment or unemployment, which is the expected result in much of the theoretical literature.[7]

Our results suggest that there is clearly a drop in income for private covered sector workers who were near the MW and lost their jobs, since most became unpaid family workers or left the labor force (where they no longer earn any wage). However, given there is evidence that some workers are instigated to move to the public sector when there is an increase in the minimum wage, we next test for the wage effect on these workers. We estimate wage equation (1) on workers who leave the private covered sector and end up working as public sector workers in time t+1 and in this way, we are able to estimate whether those who change jobs after minimum wage changes end up with lower wages in the public sector. The findings show that those who move to the public sector do not have a significant change in their earnings.

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[7] The minimum wage has less of an effect on flows from private sector work to out of the labor force: a 1% increase in the minimum will raise the probability 0.15 percentage points for all workers and 0.21 for workers earning around the minimum wage. For all workers, this means raising the mean unconditional probability from 21.9% to 22.1%, which represents only a 0.6 percent increase. For workers near the minimum the mean probability would rise from 21.1% to 21.3% (or by 1.0 percent).

Next, we also estimate the effect of minimum wages on the probability of being hired into the private covered sector from self-employment, unpaid family work or the public sector. We first estimate the "overall" effect on hires from any of these sectors, and then the "specific" effect on hires from a specific sector (public sector, self-employment or unpaid family work[8]). Specifically, we use the probit technique to estimate an equation of the form:

$$Prob(TRANS_{ikz,t} = 1) = \alpha_{oz} + a_{1kz}\Delta\ln MW_{It} + \Delta X'_{it}\beta z + a_{2z}\Delta\ln GDP_{It} + \sum_{t=1}^{T}\gamma_{zt}YR_t + \mu_{ikz,t,} \quad (4)$$

For the overall effect, the dependent variable, $TRANS_{ikz,t}$, equals 1 if the individual i is hired into the covered private sector at time $t+1$ from any other sector at time t; it is equal to zero if the individual remains in an uncovered sector from t to $t+1$. For the specific effects, $TRANS_{ikz,t}$ equals 1 if the individual i is hired into the covered private sector at time $t+1$ conditional on being in another specific sector (e.g., self employment) at time t; it is equal to zero if the individual remains in the other specific sector from t to $t+1$.

Table 6 presents these estimates; a positive number in Table 6 indicates that higher minimum wages increases the probability of a transition into the private covered sector from the self-employed, public or unpaid family worker sectors, while a negative number indicates that higher minimum wages decrease the probability that a worker will transition into the private covered sector. The results imply that an increase in the legal minimum wage has a negative and statistically significant impact on the probability that a worker will be hired into the private covered sector from the public sector or self-employment, especially for those workers whose wage was within 20% of the minimum wage in the first period. The marginal effect is large. A 1% increase in the minimum wage lowers the probability that a either a self-employed or public sector worker at time t will be hired into the private covered sector at t+1 by 0.52 percentage points for all workers within 20% of the MW and by 3.66 for all full-time workers near the minimum.

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[8]We cannot measure whether legal minimum wages affect the transitions from unemployment and out of the labor force into the private formal sector because we do not know the industry of employment of those who are unemployed or not in the labor force in both time t and time t+1.

We find no evidence that higher minimum wages have impact on the transition from unpaid family work into the covered private sector.

In summary, the results of the estimation of the transition equations suggests that the decrease in employment in the covered private sector that results from a higher legal minimum wage is due both to workers leaving the private covered sector and to a reduction in the number of workers being hired into the private covered sector from the uncovered sectors. Specifically, most workers who lose their jobs in the covered private sector as a result of higher legal minimum wages leave the labor force or go into unpaid family work; a smaller proportion find work in the public sector. We find no evidence that workers who lose their jobs in the covered private sector because of higher minimum wages become unemployed.

6. Effects on Household Income and Poverty Alleviation

The impact of legal minimum wages on households at different points in the distribution may be different from the impact on the distribution of wages. Low wage workers may be secondary family workers in high income households while high wage workers may be the only workers in low wage households. As Addison and Blackburn (1999) and Fields, Han and Kanbur (2007) point out, the impact of legal minimum wages on household incomes depends on how the pattern of employment composition changes within households. We cannot, therefore, infer from our results on the impact of minimum wages on individual wages and employment what the impact will be on either the distribution of household income or poverty alleviation. We must study directly the impact of legal minimum wages on household incomes.

Minimum wage increases can help families move out of poverty if the family members keep their jobs and benefit from a wage increase, but they may be just as likely to stay poor (or become poor) if a family member affected by a minimum wage increase loses his/her job. In this section we examine the extent to which a minimum wage increase helps a family move out of poverty or push a family into poverty. Given the importance

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of the head of the household's income in the total income of the family,[9] we carry out an analysis that distinguishes the effect of minimum wage on the head and non-heads of the household.

6.1 *Relationship between the levels of the Poverty Lines and the Minimum Wages*

Before we begin the analysis, it is necessary to get a sense on how high the minimum wage is relative to the poverty line. Fields, Han and Kanbur (2007) point out that if the minimum wage is set above the poverty line, then an increase in the minimum wage will not affect the poverty rate (because those whose wage increases because of the minimum wage increase were already non-poor). However, it is complicated by the fact that a poverty line is set for a family and the minimum wage usually is for an individual. However, it turns out that in Nicaragua, one minimum wage is supposed to support an average family; hence this makes comparing the level of the minimum wage to the poverty line a worthwhile exercise.

In Nicaragua there are two sets of poverty lines, one constructed by INEC, the National Institute of Statistics and Census, and the other by FIDEG. In our analysis we use the one by FIDEG, but we think it is instructive to understand how each is constructed and the relationship between the two. In the FIDEG survey the poverty lines are based on the value of a basic basket of 53 goods and services consumed by a family of four adults and two children, which is fixed by the Central Bank of Nicaragua each year. The goods and services in the basket, determined as the basic needs (protein and caloric as well as housing, clothing, transportation, etc.), are valued each year at the market prices. The extreme poverty line is set at the value of one basket while the poverty line is set at the value of two baskets. During the time of our study, the methodology for calculating the basic basket did not change. INEC sets a poverty line based on consumption and using data from the World Banks LSMS in 1998, 2001 and 2005. The extreme poverty line is defined as cost of the annual level of food consumption needed to satisfy the minimum

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[9] The head of the household's labor income accounts on average for 74% of the household's income; in poor households it rises to 81% and in non-poor households it is only 55%.

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caloric needs of a person, which were determined as 2,187 calories per day in 1998 and 2001 and 2,241 calories per day in 2005. The poverty line was equal to the amount of the extreme poverty line plus an additional sum to cover the cost of consuming essential non-food goods and services (such as housing, transportation, education, clothing, housing, etc.).

In Panel A of Table 7 we present the poverty lines (in nominal Córdobas) for poverty and extreme poverty in the years 1998-2006 as calculated by FIDEG and INEC. The first two columns present the data as reported by each institution and in the next two we report the data in comparable terms "monthly income per capita." It is clear from the last two columns of the table that the ratio between the two sources is fairly constant. In each of the three years, the FIDEG per capita poverty and extreme poverty lines are about 40-50% higher than the INEC poverty lines. Hence, we should be aware that we are using a relatively high poverty line in this study.

In Panel B of Table 7 we compare the minimum monthly minimum wage and the average monthly minimum wage (weighted by the number of workers in the sample in each minimum wage category) to the monthly poverty lines. We do so for both the per capita poverty line (i.e., for one individual) and the poverty line for a family of six individuals, since the law stipulates that the minimum wage should support a family. As we can see from Table 7, panel B, the minimum wage is set well below both the extreme poverty line and the poverty line for a family of 6. This is true whether we compare the average minimum wage or the minimum minimum wage to the poverty line. The average minimum wage is between 25% and 42% of the extreme poverty line for a family of six and between 12% and 21% of the poverty line for a family of six. For a family with only one member, the minimum minimum wage is set above the per capita extreme poverty line but below the per capita poverty line, while the average minimum wage is set above both the extreme poverty line and the per capital poverty line. Over time, the minimum wage increases relative to the poverty line. What is clear is that the minimum wage could not possible cover the needs of a family; at best it may cover the minimum basic needs of

an individual (although this depends on which minimum wage applies). Therefore, there is clearly scope for higher minimum wages to affect the poverty rate in Nicaragua.

6.2 Impact of the minimum wage on poverty

We next ask to what extent workers who earn the minimum wage are likely to be poor. Because of the relative importance of their income for the household, the analysis is carried out separately for heads v. non-heads of household. The numbers in Table 8 clearly indicate that if a household head is earning at or above the minimum wage, he/she is very likely to be in a non-poor household: 57% of the heads of households who earn around the MW are non-poor and 81% of the heads who earn above the minimum are non-poor. However, if a non-household head is earning at or above the minimum wage, he/she is much less likely to be in a non poor household, where the comparable percentages are 37% and 58%. Finally, both heads and non-heads of households are likely to be extremely poor or poor if they earn below the minimum wage.

These results in Table 8 are a static picture of the probability that a worker is poor or non poor based on status in the household and ratio of own wage to the minimum wage. We next ask "What is the impact of a change in the minimum wage on the probability that a household is poor?" We answer this question using the panel data and estimating a probit equation using data for all workers, where the dependent variable is equal to 1 if the worker's household is poor at t+1 (Poor =1) and 0 if non poor at time t+1 (Poor = 0), as a function of the change in the minimum wage from the period t to t+1:

$$Prob(POOR_{it} = 1) = \alpha_o + a_1 \Delta \ln MW_{It} + \Delta X'_{it}\beta + a_2 \Delta \ln GDP_{It} + \sum_{t=1}^{T} \gamma_t YR_t + \mu_{it}, \quad (5)$$

From the coefficient a_1 we calculate the impact of a one percent change in the minimum wage on the probability that a worker's family is poor. The other variables in this equation are the same as those in equations (1) through (4).

The results from this exercise, presented in Table 9, indicate that an increase in the minimum wage will significantly lower the probability that a household is poor, but only

if the higher minimum wage applies to the household head; minimum wage increases for non-household heads have an insignificant impact on the incidence of poverty. The marginal effect (where all variables are taken at their mean values) of a 1% increase in the minimum wage lowers the incidence of poverty by 0.12 percentage points if it impacts a head. Further, higher minimum wages have a significant positive impact only on families with more than one worker at time t. Possibly this is because the minimum wage is set very low relative to the poverty line for a family, who are therefore likely to transition out of poverty only if the family receives income from at least two workers. The impact of a minimum wage increase does not differ significantly between male and female household heads.[10]

Up to now we have determined that changes in the minimum wage reduce the incidence of poverty if they impact heads of households with certain characteristics, but do they actually help households transition out of poverty? Moreover, it might be possible that households with certain characteristics may be more likely to transition into poverty if some members lose their jobs as a result of the minimum wage increase. In the next exercise, we estimate the impact of a change in the minimum wage on the probability that a poor household at time t becomes non-poor at time t+1 and *vice versa*, that a non-poor household at time t becomes poor at t+1. Specifically, we estimate two poverty transition equations. In the first, using a sample of workers in poor households in time t, we estimate a probit equation of the form:

$$Prob(OUTPOV_{it} = 1) = \alpha_o + a_1 \Delta \ln MW_{It} + \Delta X'_{it}\beta + a_2 \Delta \ln GDP_{It} + \sum_{t=1}^{T} \gamma_t YR_t + \mu_{it}, \quad (6)$$

In equation 6, $OUTPOV_{it}$ equals one if the family of worker i is poor in time t but not poor in time t+1, and zero if the family of worker i is poor at time t and stays poor in time t+1. The independent variables include the change in the log of the minimum wage applicable to the worker's job in time t. The coefficient on this minimum wage variable, a_1, allows us to measure the impact of an increase in the minimum wage on the probability that a worker's household will move out of poverty. We estimate the impact of minimum wages on the transition out of poverty separately for household heads and

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[10] Nor does the impact differ depending on the size of the household.

non-heads, and for household heads with different characteristics. The other variables in equation (6) are the same as those in the employment transition equations.

Next, using a sample of workers in non-poor households in time t, we estimate a probit equation of the form:

$$Prob(INPOV_{it} = 1) = \alpha_o + a_1 \Delta \ln MW_{It} + \Delta X'_{it}\beta + a_2 \Delta \ln GDP_{It} + \sum_{t=1}^{T} \gamma_t YR_t + \mu_{it}, \quad (7)$$

In equation 7, $INPOV_{it}$ equals one if the family of worker i is not poor in time t but is poor in time t+1, and zero if the family of worker i is not poor at time t and stays not poor in time t+1. The independent variables include the change in the log of the minimum wage of applicable to the worker's job in time t. The coefficient on this variable, a_1, allows us to measure the impact of an increase in the minimum wage on the probability that a family that was not poor will become poor. We estimate the impact of minimum wages on the transition into poverty separately for household heads and non-heads, and for household heads with different characteristics. The other variables in equation (7) are the same as those in the employment transition equations.

The results of the estimation of equations (6) and (7) are presented in Table 10. The findings in Table 10 indicate that increases in the minimum wage will pull households out of poverty but will not throw households into poverty. We find that the marginal effect of an increase in the minimum wage has no statistically significant impact on the probability that a worker in a non-poor household becomes poor in the next period, irrespective of the characteristics of the household. On the other hand, a 1% increase in the minimum wage will increase the probability that a worker in a poor household at t will become non-poor at t+1 by 0.12 percentage points. Higher minimum wages help pull families out of poverty only if the higher minimum wage applies to the head of the household; a higher minimum wage for a non-household head has an insignificant impact on the probability that a poor family will leave poverty.

We have found that higher minimum wages increase the probability that a household will transition out of poverty, even though higher minimum wages lead to decreased in

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employment in the private covered sector. Further, we find that the positive impact of minimum wages on the transition out of poverty occurs only if the minimum wage increases for the household head; increases in minimum wages for non-heads does not improve the chances that a household will leave poverty. This suggests that the negative impact of higher minimum wages on employment might be less for household heads compared to non-heads. If employers in Nicaragua tend to be paternalistic, they may be more likely to keep a worker that they know he/she is the head of a household with dependents rather than a worker that they perceive as a secondary earner, whose income is less important for the household. Hence we next re-estimate equations as in Tables 4 and 5, but distinguishing whether the worker is the head of the household or not.

We find support in Table 11 for the hypothesis that, faced with an increase in minimum wages, private covered sector employers in Nicaragua tend to layoff non-heads of household more easily than heads of households. Although Table 11 presents evidence that both household heads and non-heads are more likely to lose their jobs in the private covered sector when minimum wages increase, the marginal effect is nearly twice as large for non-heads as heads.

Further, the destination sectors for those workers who lose their jobs in the private covered sector because of higher minimum wages differ between household heads and non-heads. In Table 12 we present the marginal effects of the same equation estimated in Table 5 but for heads v. non-heads of household.   Non-heads who leave the private covered sector are most likely to become unpaid family workers or to leave the labor force (and therefore do not receive any wage), while household heads who leave the private covered sector are most likely to become self-employed (where they are still making income). Thus, when minimum wages cause workers to lose their job in the private covered sector, the negative impact on family income is much greater if the worker is a non-head compared to a household head. But given the relative size of their incomes, the fact that the head of the household is able to replace some portion of his/her

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income with self-employment earnings[11] can also help explain why the negative employment effects of higher minimum wages do not push households into poverty.[12]

In the first part of this paper, we found that a 10% in the minimum wage increased the wage for private covered sector workers within 20% of the minimum wage by about 5%, but also decreased employment among these same workers in the private covered sector by more than 5%. We also found that, on average, workers who lost their jobs in the private covered sector were likely to become unpaid family workers or leave the labor force, and thus earn no income. Given the counteracting wage and employment effects, it was surprising that we found that a higher minimum wage led to a reduction in poverty among households. The solution to this seeming puzzle is the different impacts a higher minimum wage has on household heads and non-heads. Household heads (who in general earn the highest fraction of household income) are less likely than non-household heads to lose their jobs in the private covered sector when minimum wages increase. Further, those household heads that do lose their jobs in the private covered sector are likely to move into the uncovered, self-employed sector and do not see their incomes reduced to zero. On the other hand, non-household heads that lose their jobs in the private covered sector become unpaid family workers or leave the labor force, and thus the household suffers a substantial loss in income.

7. Conclusions

In this paper, we find that in Nicaragua, during the 1998-2006 period when legal minimum wages are set high relative to the median wage, changes in the minimum wage increase the wages and decrease the employment of workers in the private covered sector. However, we find that minimum wages affect only those workers whose initial wage (before the change in minimum wages) is close to the minimum: for example, increases in the legal minimum wage lead to significant increases in the wages (elasticity of about

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[11] Our analysis indicates that the labor income of these heads of households is not lowered significantly as they transition from covered sector salary work to self-employment. Hence they seem to replace most if not all of the lost labor income.

[12] Higher minimum wages also reduce the probability that both household heads and non-heads will be hired into the private covered sector. In this case, there is no significant difference between the impact of minimum wages on household heads and non-heads.

0.6) and decreases in employment (with an elasticity of about 0.5) of private covered sector workers who have wages within 20% of the minimum wage before the change, but have no significant impact on wages in other parts of the distribution. Moreover, the effects are stronger among workers in large firms than in small firms (less than five employees). The estimates from the employment transition equations suggest that the decrease in covered private sector employment is due to a combination of layoffs and reductions in hiring. Most workers who lose their jobs in the covered private sector as a result of higher legal minimum wages leave the labor force or go into unpaid family work. We find no evidence that these workers become unemployed.

Our analysis of the relationship between the minimum wage and poverty finds: a) the minimum wage is set fairly low relative to the poverty line used in the survey; b) increases in legal minimum wages increase the probability that a poor worker's family will move out of poverty, and c) increases in legal minimum wages are more likely to reduce the incidence of poverty and improve the transition from poor to non-poor if they impact the head of the household rather than the non-head. This is because the head of the household is less likely than a non-head to lose his/her job from a minimum wage increase, and because those heads who do lose their jobs are more likely to go to another paying job (self-employment) than non-heads who lose their jobs from a minimum wage increase (non-heads are more likely to go into unpaid family work or leave the labor force).

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Table 1: Real Minimum Wage (Córdobas per hour) in Nicaragua, 1991-20006

Categories	1997	1998*	1999	2000*	2001	2002	2003	2004	2005	2006
	Nov	-	Aug	-	Mar	May	Aug	Jun	May	Mar
Agriculture**	0.90	0.79	1.08	1.00	1.14	1.17	1.18	1.17	1.23	1.26
Fishing	1.51	1.32	1.69	1.56	1.63	1.74	1.82	1.82	1.90	1.99
Mining	1.81	1.58	2.05	1.89	1.97	2.10	2.20	2.19	2.30	2.35
Industry	1.51	1.32	1.45	1.33	1.39	1.47	1.58	1.57	1.64	1.76
Industry under special regime			1.93	1.78	1.86	1.93	1.98	1.98	2.07	2.14
Electricity and Gas	1.81	1.58	2.17	2.00	2.10	2.24	2.25	2.25	2.35	2.40
Water	1.81	1.58	2.17	2.00	2.10	2.24	2.25	2.25	2.35	2.40
Trades, Restaurants and Hotels	1.66	1.45	2.17	2.00	2.10	2.15	2.25	2.25	2.35	2.40
Transport, storage and communication	1.36	1.19	2.17	2.00	2.10	2.24	2.25	2.25	2.35	2.40
Construction	1.45	1.27	2.90	2.67	2.70	2.75	2.77	2.77	2.93	2.93
Financial	2.11	1.85	2.41	2.22	2.32	2.48	2.77	2.77	2.93	2.93
Insurance	1.96	1.72	2.41	2.22	2.32	2.48	2.77	2.77	2.93	2.93
Comunitary, personal and domestic services	1.42	1.24	1.69	1.56	1.63	1.67	1.65	1.70	1.78	1.83
Central and municipal governments	1.05	0.92	1.33	1.22	1.31	1.52	1.53	1.54	1.61	1.63

Source: MITRAB

*No negotiation. Same Minimum wage as in previous year.

**Agricultural workers were to be fed in addition (Artículo No. 202 Código del Trabajo)

Table 2: Percent of Workers in Nicaragua Earning Within 20%, Below and Above the Legal Minimum Wage, By Sector (averages over 1998-2006).

Sector	Below MW	At MW	Above MW
All Workers:			
Private Covered Sector	23.25	25.46	51.25
Large Firms	11.37	24.16	64.47
Small Firms	34.15	26.64	39.21
Covered Public Sector	4.07	9.39	86.54
Uncovered Self-employed Sector	24.59	15.59	59.86
Full-time Workers Only			
Private Covered Sector	20.67	26.40	52.93
Large Firms	10.00	23.72	66.28
Small Firms	32.50	29.35	38.15
Covered Public Sector	2.78	8.91	88.31
Uncovered Self-employed Sector	25.37	15.85	58.91

Source: Author's calculations using FIDEG and MITRAB data.

Table 3: Elasticity of the Wage w.r.t. the Minimum Wage in the Covered Sector

For all workers who remain in the following sectors at time t and t+1:	All Workers[1]		All Workers within 20% of MW at time t[1]			Full-time Workers within 20% of MW at time t[2]		
	Coeff.	*Std Error*	Coeff.	*Std. Error*		Coeff.	*Std. Error*	
private covered	0.247	*0.237*	0.579	*0.267*	**	0.651	*0.084*	***
large-firm private	-0.222	*0.345*	0.561	*0.414*		1.037	*0.365*	**
small-firm private	0.094	*0.588*	0.306	*0.117*	**	0.702	*0.224*	**
self-employed	0.094	*0.42*	0.652	*0.493*		-0.173	*0.202*	

Notes: *** = significant at 1%, ** = significant at 5%, * = significant at 10%

[1]Dependent variable is D log of hourly wages; estimated coefficients for a1 in equation (1) for samples identified by row and column.

[2]Dependent variable is D log of monthly wages; estimated coefficients for a1 in equation (1) for samples identified by row and column.

Table 4: Marginal Impact of Minimum Wages on the Probability that a Worker Keeps His/Her Job in the Covered Sector

For all workers in the following sectors at time t:	All Workers			All workers within 20% of MW at time t			Full-time workers within 20% of MW at time t		
	Marginal	*Std. Error*		Marginal	*Std. Error*		Marginal	*Std. Error*	
private covered	-0.31	*0.127*	**	-0.522	*0.148*	***	-0.509	*0.534*	
large-firm private	-0.615	*0.164*	***	-1.197	*0.215*	***	-2.126	*0.814*	***
small-firm private	0.038	*0.241*		-0.098	*0.269*	**	-0.847	*0.937*	

Notes: Table reports marginal effects evaluated at the means of all variables, from estimates of a_1 in equation (2) using probit regressions for samples identified by row and column. A positive coefficient means that higher minimum wages increase the probability that a worker stays in the indicated covered private or public sector. *** = significant at 1%, ** = significant at 5%, * = significant at 10%.

Table 5: Marginal Impact of Minimum Wages on the Probability of Leaving the Private Covered Sector for another Sector

Destination:	All Workers			All Workers within 20% of MW at time t			Full-time Workers within 20% of MW at time t		
	Marginal	Std. Error		Marginal	Std. Error		Marginal	Std. Error	
Panel A: Multinomial Logit Regression (Origin is Private Covered Sector) to **Destination Sector**:									
Public	0.069	0.058		0.112	0.061	*	-0.302	0.301	
Self-employed	-0.018	0.083		0.043	0.096		0.206	0.243	
Unpaid Family Worker	0.144	0.058	**	0.174	0.063	***	0.421	0.209	**
Unemployed	-0.046	0.048		-0.035	0.057		0.086	0.156	
Not in the Labor Force	0.152	0.087	*	0.213	0.129	**	-0.068	2.447	
Panel B: Unconditional Probabilities of Leaving the Private Covered Sector									
Stay in Private Sector	0.547			0.540			0.558		
Public	0.036			0.042			0.036		
Self-employed	0.107			0.111			0.103		
Unpaid Family Worker	0.047			0.053			0.046		
Unemployed	0.047			0.042			0.043		
Not in the Labor Force	0.219			0.211			0.213		

Notes: Panel A provides marginal effects, based on estimates of a_{1kz}, evaluated at the means of all variables, in equation (3) using logit regressions, respectively, for samples identified by row and column. A positive coefficient means that higher minimum wages increase the probability of a transition from the private covered sector. *** = significant at 1%, ** = significant at 5%, * = significant at 10%.

Table 6a: Marginal Impact of Minimum Wages on the Probability of Entering the Private Sector from Another Sector

Origin Sector:	All Workers		All Workers within 20% of MW at time t			Full-time Workers within 20% of MW at time t		
	Marginal	Std. Error	Marginal	Std. Error		Marginal	Std. Error	
All Others (non-private)	-0.084	0.067	-0.524	0.124	***	-3.661	1.001	****
Public	-7.925	4.341 *	-7.874	4.999		-20.421	40.089	
Self-employed	-0.157	0.081 **	-0.281	0.083	***	-0.499	0.659	
Unpaid Family Worker	0.119	0.104	n.a.	n.a.		n.a.	n.a.	

Table 6b: Unconditional Probability of Entering the Private Sector from Another Sector (average over all years)

Origin Sector:	For all Workers	For Workers Within 20% of MW at time t	Full-time Workers Within 20% of MW at time t
All Others (non-private)	0.109	0.131	0.207
Public	0.219	0.256	0.268
Self-employed	0.087	0.083	0.119
Unpaid Family Worker	0.097	n.a.	n.a.

Notes: Table provide marginal effects of the estimated a_{1z} in a variant of equation (3) using probit for samples identified by row and column. A positive coefficient means that higher minimum wages increase the probability of a transition from the private covered sector. ***= significant at 1%, **= significant at 5%, *= significant at 10%.

Table 7: Poverty Lines and Minimum Wages in Nominal Cordobas

Panel A: Relationship between the FIDEG and INEC Poverty Lines

Year	FIDEG Extreme Poverty monthly for 6 individs	FIDEG Poverty monthly for 6 individs	INEC Extreme Poverty annual for 1 individ	INEC Poverty annual for 1 individ	FIDEG Extreme Poverty monthly for 1 individ.	FIDEG Poverty monthly for 1 individ.	INEC Extreme Poverty monthly for 1 individ.	INEC Poverty monthly for 1 individ.	FIDEG/INEC Extreme Poverty	FIDEG/INEC Poverty
1998	1578.2	3156.5	2246.0	4259.0	263.0	526.1	187.2	354.9	1.4	1.5
1999	1694.1	3388.2			282.3	564.7				
2000	1852.4	3704.7			308.7	617.5				
2001	1980.1	3960.3	2691.0	5157.0	330.0	660.0	224.3	429.8	1.5	1.5
2002	2078.1	4156.2			346.3	692.7				
2003	2208.9	4417.9			368.2	736.3				
2004	2464.6	4929.2			410.8	821.5				
2005	2682.7	5365.3	3927.5	7154.8	447.1	894.2	327.3	596.2	1.4	1.5
2006	2937.7	5875.4			489.6	979.2				

Panel B: Relationship Between the Minimum Wage and the FIDEG Poverty Lines

Year	Nominal Minimum Monthly Min Wage	MW as % of Extreme Poverty for 1	MW as % of Poverty for 1	MW as % of Extreme Poverty for HH of 6	MW as % of Poverty for HH of 6	Nominal Average Monthly Min Wage	MW as % of Extreme Poverty for 1	MW as % of Poverty for 1	MW as % of Extreme Poverty for HH of 6	MW as % of Poverty for HH of 6
1998	300.0	114.1	57.0	19.0	9.5	401.8	152.8	76.4	25.5	12.7
1999	450.0	159.4	79.7	26.6	13.3	610.6	216.3	108.1	36.0	18.0
2000	450.0	145.8	72.9	24.3	12.1	632.9	205.0	102.5	34.2	17.1
2001	550.0	166.7	83.3	27.8	13.9	724.1	219.4	109.7	36.6	18.3
2002	580.0	167.5	83.7	27.9	14.0	783.1	226.1	113.1	37.7	18.8
2003	615.0	167.0	83.5	27.8	13.9	859.5	233.5	116.7	38.9	19.5
2004	669.0	162.9	81.4	27.1	13.6	914.0	222.5	111.3	37.1	18.5
2005	769.0	172.0	86.0	28.7	14.3	1052.4	235.4	117.7	39.2	19.6
2006	869.0	177.5	88.7	29.6	14.8	1242.3	253.7	126.9	42.3	21.1

Sources: FIDEG, INEC and MITRAB

Table 8: Percent of Workers Earning Within 20%, Below and Above the Legal Minimum Wage, by the whether Household is Poor or Not

Poverty Status	All Workers			Heads of Household			Non-Heads of Household		
	Below MW	At MW	Above MW	Below MW	At MW	Above MW	Below MW	At MW	Above MW
Extremely Poor	51	29	16	45	21	9	54	34	21
Poor	27	27	17	26	21	10	28	30	21
Not Poor	22	44	67	59	57	81	18	36	58
TOTAL	100	100	100	130	99	100	100	100	100

Note: Using the FIDEG definition of poverty.

Table 9: Impact of Changes in Minimum Wages on the Probability that a Household is Poor in t+1

	Marginal	Std. Error	
All	-0.070	0.063	
Head of HH	-0.124	0.067	*
Non-Head of HH	-0.033	0.065	
Male Head of HH	-0.120	0.069	*
Female Head of HH	-0.101	0.084	
Head of HH with 1 worker	-0.009	-0.084	
Head of HH with 2+ workers	-0.166	0.069	**

Note: Using the survey's definition of poverty. A negative coefficient means that higher minimum wages lower the probability that a household is poor at time t+1. Unweighted. *** = significant at 1%, ** = significant at 5%, * = significant at 10%.

Table 10: Marginal Impact of Minimum Wages on the Probability of a Worker's Family Transitions into or out of Poverty

| | Transition from Poor to Non-Poor | | | Transition from Non-Poor to Poor | |
	Marginal	Std. Error		Marginal	Std. Error
All Workers	0.122	0.060	**	0.113	0.150
Head of Household	0.160	0.064	**	0.075	0.158
Non-Head of Household	0.095	0.062		0.143	0.154
Male Head of HH	0.145	0.067	**	0.056	0.164
Female Head of HH	0.183	0.079	**	0.160	0.197
Head of HH with 1 worker	0.132	0.078	*	0.271	0.203
Head of HH with 2+ workers	0.172	0.066	**	0.013	0.163

Note: A positive coefficient means that higher minimum wages increase the probability of a transition. Unweighted. *** = significant at 1%, ** = significant at 5%, * = significant at 10%.

Table 11: Marginal Impact of Minimum Wages on the Probability that a Worker Keeps His/Her Job in the Covered Sector

For all workers in the following sectors at time t:	All Heads of Households (HHH)			All Non-heads of HH		
	Marginal	Std. Error		Marginal	Std. Error	
private	-0.175	0.141		-0.384	0.131	***
large-firm private	-0.366	0.187	**	-0.753	0.172	***
small-firm private	0.005	0.255		0.057	0.245	

For all workers in the following sectors at time t:	All Heads of HH within 20% of MW at time t			All Non-Heads within 20% of MW at time t		
	Marginal	Std. Error		Marginal	Std. Error	
private	-0.447	0.315	**	-0.558	0.159	***
large-firm private	-0.884	0.319	***	-1.331	0.238	***
small-firm private	-0.079	3.543		-0.094	0.284	

Notes: Table reports marginal effects evaluated at the means of all variables, from estimates of a_1 in equation (2) using probit regressions for samples identified by row and column. A positive coefficient means that higher minimum wages increase the probability that a worker stays in the indicated covered private or public sector. *** = significant at 1%, ** = significant at 5%, * = significant at 10%.

Table 12: Marginal Effect of Minimum Wages on the Probability of Leaving the Private Sector for another Sector

Origin: Private Sector	All Heads of Households (HH)			All Non-heads of HH		
Destination:	Marginal	Std. Error		Marginal	Std. Error	
Public	0.097	0.062		0.074	0.060	
Self-employed	0.244	0.086	***	-0.264	0.094	***
Unpaid Family Worker	-0.175	0.088	**	0.192	0.055	***
Unemployed	-0.097	0.060		-0.009	0.099	
Not in the Labor Force	-0.199	0.116	*	0.262	0.087	***
Origin: Private Sector	**All Heads of HH within 20% of MW at time t**			**All Non-Heads within 20% of MW at time t**		
Destination:	Marginal	Std. Error		Marginal	Std. Error	
Public	0.143	0.070	**	0.110	0.064	*
Self-employed	0.287	0.112	**	-0.146	0.115	
Unpaid Family Worker	-0.084	0.125		0.264	0.061	***
Unemployed	-0.070	0.088		-0.010	0.060	
Not in the Labor Force	-0.072	0.163		0.289	0.099	***

Notes: marginal effects, evaluated at the means of all variables, based on estimates of a_{1kz} in equation (3) using logit regressions for samples identified by each column. A positive coefficient means that higher minimum wages increase the probability of a transition from the private covered sector. *** = significant at 1%, ** = significant at 5%, * = significant at 10%.

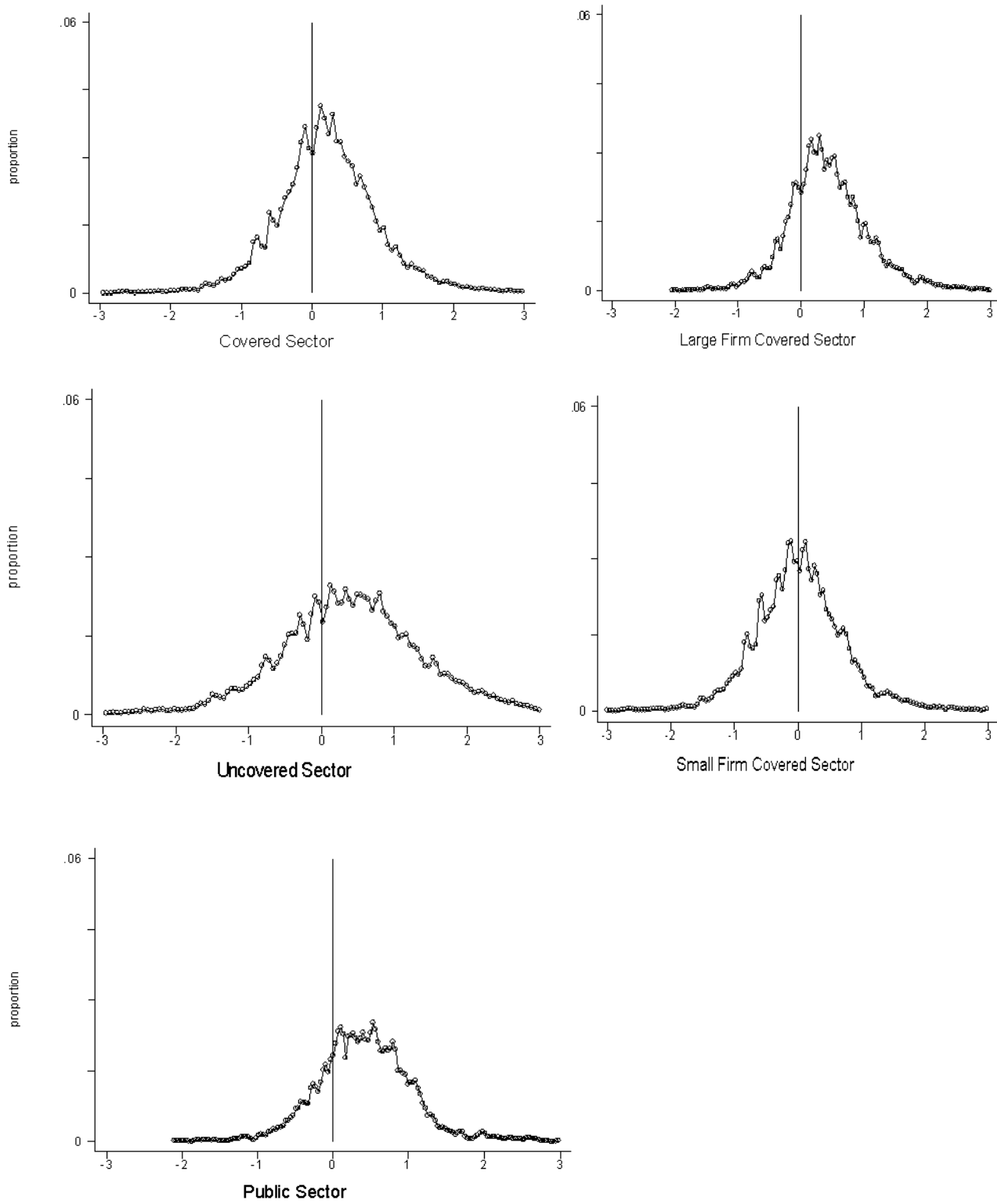**Figure 1: Graphs of Log Wage - Log Minimum Wage, All Years and All Workers**

Covered Sector

Large Firm Covered Sector

Uncovered Sector

Small Firm Covered Sector

Public Sector

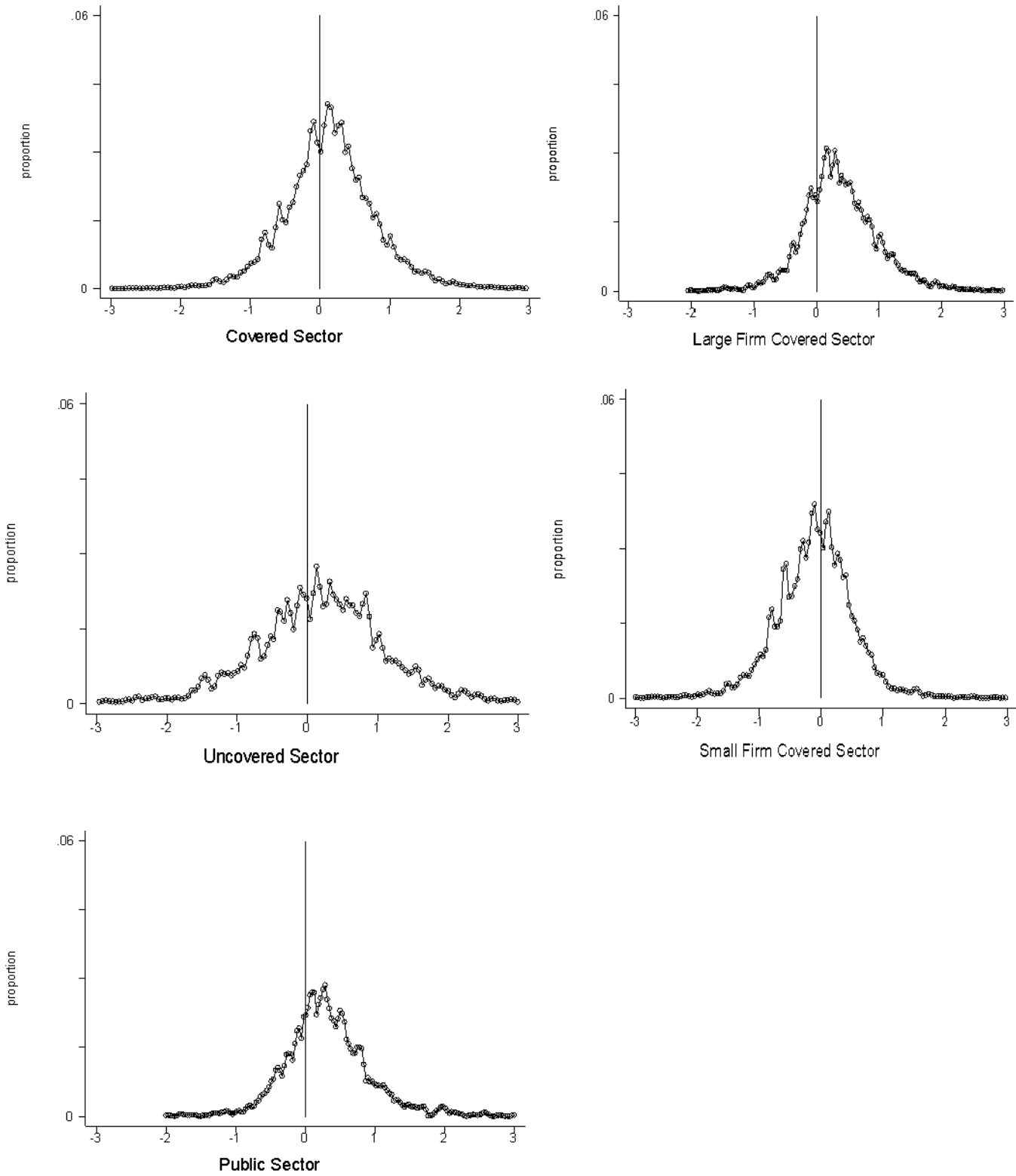**Figure 2: Graphs of Log Wage - Log Minimum Wage, All Years, Full-time Workers Only**

Table A1: Descriptive Statistics of Panel Data

Individual Data (sample used to estimate the employment equations):		Household Data	
Number of Individuals	8682	Number of households	14334
Number of observations	27000		
Average number of observations per individual	3.1	Share of households headed by women	34.28
		Distribution of households by number of members	
Percent of individuals with 9 observations	6.86		
Percent of individuals with 8 observations	5.51	1	1.22
Percent of individuals with 7 observations	5.83	2	3.64
Percent of individuals with 6 observations	6.63	3	8.02
Percent of individuals with 5 observations	9.54	4	13.52
Percent of individuals with 4 observations	13.41	5	15.36
Percent of individuals with 3 observations	19.95	6	14.33
Percent of individuals with 2 observations	32.27	more than 6	43.91
		Distribution of households by number of working members	
Percent Female	42.07		
Percent Urban	47.21	1	27.51
Distribution by Education Level		2	31.89
None (0 years of education)	10.37	3	19.06
Primary (1-8 years of education)	45.17	4	11.48
Secondary (9-12 years of education)	35.15	5	5.52
Higher	9.31	6	3.43
		more than 6	0.83
		Distribution of households by number of nonworking members	
	All	1	10.06
Percent working in:		1	10.06
large private sector covered firms	13.26	2	15.77
small private sector covered firms	14.69	3	18.28
public sector	4.71	4	16.64
self-employed	28.91	5	13.50
unpaid family workers	19.40	6	10.55
unemployed	2.13	more than 6	14.71
out of the labor force	16.91		
Percent of those employed at time t			
full-time	64.00		
part-time	36.00		
within 20% of minimum wage at time t			
Percent working in:	23.95		
large private sector covered firms	27.58		
small private sector covered firms	14.08		
public sector	34.39		
Percent of those employed at time t			
part-time	28.46		
full-time	71.54		

Table A2: Comparison of the FIDEG data with LSMS data -- Distribution of Employed

	FIDEG		EMNV - LSMS	
	1998	2005	1998	2005
Economic Sector				
Primario	**33.9**	**27.2**	**35.9**	**35.1**
Agropecuario, caza y pesca	33.9	27.2	35.9	35.1
Secundario	**15.2**	**17.8**	**14.6**	**18.7**
Minas y canteras	-	0.1	0.5	0.4
Industria manufacturera	15.2	15.3	9.4	14.0
Industrias sujetas a regimen especial	-	2.3	-	-
Construccion	-	-	4.7	4.2
Terciario	**50.9**	**55.0**	**49.4**	**46.2**
Electricidad, Gas y Agua	-	-	0.6	0.8
Comercio, Hotel y restaurantes	50.4	48.0	24.1	21.7
Transporte, Almacén y comunicación	-	3.1	3.7	3.4
Establecimiento financiero	-	-	0.4	0.7
Servicio comunal, social y personal	0.5	3.9	20.6	19.9
Employment Status:				
Patrón	3.5	3.2	3.6	4.5
Cuenta propia	32.5	32.6	27.5	30.2
Asalariado	43.9	40.5	52.8	49.0
No remunerado	20.1	23.7	15.8	16.3
Unemployment				
Nacional	7.7	4.2	11.6	4.0
Urbano	9.5	5.1	13.9	5.8
Rural	5.9	3.4	8.7	1.5
Hombres	4.6	2.9	10.6	3.7
Mujeres	12.2	5.8	13.5	4.5
Average Monthly Salary (1994 Cordobas)				
Nacional	671.5	759.9	804.1	864.7
Urbano	724.8	812.3	995.3	1041.3
Rural	601.5	689.3	502.8	570.0
Hombres	775.7	933.2	896.0	948.3
Mujeres	534.8	569.8	637.3	714.9
Median Monthly Salary (1994 Cordobas)				
Nacional	385.6	465.4	449.9	500.4
Urbano	501.3	558.6	525.1	620.6
Rural	334.2	403.3	321.3	349.1
Hombres	501.3	581.8	462.7	543.1
Mujeres	335.1	387.9	385.6	465.5

Table A4: The Marginal Impact of Minimum Wages on the Probability of Entering the Large-Firm Private Covered Sector, from the transition probit equations, Nicaragua

Destination Sector: Large-firm Private Sector

Origin Sector:	Coeff.	Std. Error	
Public	-0.057	0.034	*
Small-firm	0.064	0.172	
Self-employed	-0.027	0.044	
Unpaid Family Worker	0.085	0.063	

Note: A positive coefficient means that higher minimum wages increase the probability of a transition into the private covered sector. A negative number means that higher minimum wages decrease the probability of a transition into the private covered sector.

Notes: *** = significant at 1%, ** = significant at 5%, * = significant at 10%

Table A3: The Marginal Impact of Minimum Wages on the Probability of Leaving the   Large-Firm Private Covered Sector, from the transition logit equations, Nicaragua

Origin Sector: Large-firm Private Sector

Destination Sector:	Coeff.	Std. Error	
Public	0.478	0.193	**
Small-firm	0.837	0.165	***
Self-employed	0.58	0.197	***
Unpaid Family Worker	0.806	0.187	***
Unemployed	0.206	0.166	
Not in the Labor Force	0.738	0.209	***

Note: A positive coefficient means that higher minimum wages increase the probability of a transition from the private covered sector. A negative number means that higher minimum wages decrease the probability of a transition from the private covered sector

Notes: *** = significant at 1%, ** = significant at 5%, * = significant at 10%