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Francisco Cabrera-Hernández* María Padilla-Romo‡

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Abstract

Caregiving responsibilities and the lack of family-friendly policies often prevent women from participating in the labor market. This study analyzes the effects of an implicit childcare subsidy—through longer school days—on the labor supply of grandmothers in the context of Mexico's full-time schools program. Since 2007, this program has gradually increased the school day's length by three-and-a-half hours in public elementary schools. We document how the availability of full-time schools in a municipality affects grandmothers' decisions to participate in the labor market. These effects are estimated by using data collected through a rotating panel design and within-individual variation in full-time schools' availability. Childcare subsidies through longer school days increase grandmothers' labor force participation and employment, especially in the informal market.

Keywords: Childcare; Full-time Schools; Childrearing; Grandmothers; Labor Supply

JEL classification: J13, J16, J22.

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1 Introduction

Women face several restrictions throughout their productive life that often fully or partially hinder them from participating in the labor market. One of the main restrictions they face is the penalty that motherhood imposes on women's labor supply, typically resulting from differences in the opportunity cost of time as well as conventional gender roles (Jayachandran, 2015; Rupert and Zanella, 2018; Aguilar-Gomez et al., 2019; Nix et al., 2019). Even with adult children, women continue devoting large amounts of time and money for the benefit of their grandchildren (Duflo, 2003; Ho, 2015a; Lumsdaine and Vermeer, 2015; Aparicio-Fenoll and Vidal-Fernandez, 2015).

Evidence suggests that with a newborn grandchild, grandmothers increase their likelihood of once again becoming caregivers as these women are an inexpensive, flexible, and reliable source of childcare (Ho, 2015a; Lumsdaine and Vermeer, 2015). While beneficial for young parents, this caregiving could affect older women who might be pulled out of the labor market, resulting in early retirement and reducing lifetime earnings and savings, in turn, threatening their economic stability (Hochman and Lewin-Epstein, 2013). These effects could be more detrimental in (a) developing economies where low female labor force participation (LFP) is still one of the challenges for general economic and social development (Duflo, 2012) and (b) relatively poorer households in which additional income is key to improve living standards.

Moreover, women around the world become grandmothers at a relatively young age. For example, the median age of Mexican grandmothers when their first grandchild is born is 48 years.[1] This age is comparable to that in the United States (49) and Eastern Europe (47), and it is not very different from that of Western Europe (51) (Frimmel et al., 2017). Considering a legal retirement

[1] According to the 2018 National Employment and Occupation Survey (Encuesta Nacional de Ocupación y Empleo, ENOE).

age of 65, grand-parenthood and labor market activity might overlap for over a decade. Thus, having a grandchild has the potential to significantly shorten the working life of women. In addition, the risks for their future economic stability are even higher considering the generally higher women's life expectancy, absence from the labor force during pregnancy and childrearing, and the proliferation of "pay as you go" pension systems.[2]

Mexico's full-time schools (FTS) program has extended the school day across the country from 4.5 to 8 hours in public elementary schools (ages 6 to 12), thus providing a childcare alternative. Moreover, this policy continually increased the number of FTS from 500 in 2007 to 25,000 in 2018, or in about 25% of all elementary schools across 81% of Mexican municipalities. We exploit this large variation in FTS' availability in a municipality for children ages 6 to 12 to estimate the effects of this large implicit childcare subsidy on LFP, employment, hours worked per week, monthly earnings, and participation in formal employment.

We use data collected in the National Employment and Occupation Survey (Encuesta Nacional de Ocupación y Empleo, ENOE) and a difference-in-differences identification strategy. ENOE is a rotating panel of households containing information on grandmothers LFP, the number of hours worked per week, earnings, and demographic characteristics allowing us to identify the cumulative effects of school day extensions on labor supply. The richness of our data and context allows us to provide evidence that the trends in grandmothers' propensities to participate in the labor market are similar in affected and non-affected municipalities before the program's introduction. It also allows us to show heterogeneous effects by formal education and poverty levels, and to estimate

[2]For example, in 2016 the net pension replacement rate in Mexico was 27.7% for women and 29.6% for men, compared to 62.2% and 62.9%, respectively, in the member countries of the Organization of Economic Co-Operation and Development (OECD) (OECD, 2017b).

the potential effects on grandmothers without elementary-school-age children, who are not directly affected by the intervention.

This paper contributes to the scant evidence of childcare subsidies' effects on the labor supply of grandmothers. We complement the evidence of full-time schooling's positive effects on mother's LFP, employment, and earnings in Mexico documented in Padilla-Romo and Cabrera-Hernández (2019); and we offer a more comprehensive picture of women's intra-household and inter-generational labor market decisions. Specifically, we estimate the effects that FTS' availability has on the labor outcomes of grandmothers residing in grandparent-grandchild households.[3] Interestingly, this inter-generational living arrangement is not much more common in poorer settings (17% of ENOE households below the median); but in poorer households, the extra sources of income such as that from grandmothers' labor could make a significant difference.

Literature has broadly documented the detrimental effects of childbirth on mothers' labor outcomes and how childcare policies help alleviate them (Vuri, 2016; Kleven et al., 2019; Aguilar-Gomez et al., 2019). Specific evidence has shown that "availability" of grandparents increases their daughters' LFP (Posadas and Vidal-Fernandez, 2013; Compton and Pollak, 2014; Bratti et al., 2016; Du et al., 2019; Zamarro, 2020) and that becoming grandparents reduces their own LFP and hours worked (Zanella, 2017; Frimmel et al., 2017; Backhaus et al., 2019), especially for women.[4]

Yet, less is known about the effects of public policies and specifically childcare provision for inter-generational families as related to grandmothers' labor supply, despite those grandmothers' chances to participate in the labor market, which may depend on the supply and quality of all parents' childcare alternatives. Ho (2015b) and Lin and Wang (2017) use quasi-experimental methods to

[3]This arrangement represents 16% of all the households in ENOE.

[4]For example, Rupert and Zanella (2018) explore the effects of becoming a grandparent on the labor supply of older workers in the United States. Taking advantage of the random variation in when individuals become grandparents, the authors show that the female labor supply along the intensive margin reduces 30% for women who are less attached to the labor market, with zero effects for men.

exploit childcare policies in the United States and China, respectively. Ho (2015b) shows in the context of the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) that welfare-to-work reforms subsidizing childcare for mothers significantly decrease grandchild care by about three hours per week with no discernible effects on grandmothers' labor supply at the intensive or extensive margins. In contrast, Lin and Wang (2017) find that a universal childcare program in China has increased grandmothers' labor supply at the extensive margin but not at the intensive margin.

Ho (2015b) focuses on a sub-sample of 712 single grandmothers' with working-age low-educated daughters across three waves. In addition to offering a new setting, we complement this evidence by studying the more general population of married and single grandmothers with grandchildren in elementary school, regardless of mothers' employment status or education level. We also differentiate from the population studied by (Lin and Wang, 2017), of preschool age children, by focusing on elementary-school students ages 6 to 12, who still require parental care and are often overlooked in the childcare literature (see Padilla-Romo and Cabrera-Hernández, 2019). Furthermore, our work departs from previous research by using a nationally representative rotating panel of almost 45,000 grandmothers co-residing with their grandchildren in relatively poorer households over a time span of 14-years. That panel limits the scope of selection and allows us to provide evidence of similar pre-trends on labor supply in affected and non-affected municipalities, thus supporting our identification strategy.

Our results align with previous evidence and show that implicit childcare subsidies, through longer school days, have a positive effect on grandmothers' labor supply at the extensive margin, increasing LFP by 13.7 percentage points and employment by 12.2 percentage points. At the same time, we do not find statistically significant effects for either males or grandmothers without

elementary-school-age children. We also document positive effects on grandmothers' weekly hours worked and earnings, but these are not discernible given large standard errors.[5] Notably, the effects on employment and LFP are mostly driven by grandmothers participating in the informal labor market in relatively poorer households in which additional income is key to improve living standards. In sum, the positive effects of publicly provided childcare on mothers' labor supply through longer school days, documented in previous work for Mexico (Padilla-Romo and Cabrera-Hernández, 2019), extend to older women with school-age grandchildren in relatively deprived households.

The rest of this paper proceeds as follows. Section 2 provides institutional background on Mexico's childcare policies, LFP, and the FTS Program. Section 3 presents the data used as well as some descriptive statistics. Section 4 explains our identification strategy. Section 5 presents the results. Section 6 provides final remarks.

2 Institutional Background

Mexican women have steadily increased their labor market participation in recent decades. The Mexican population census indicates that women ages 18to 65 participating in the labor force grew from 24.2% in 1990 to 45% in 2019. The highest growth was with ages 40 to 44 (57%) but decreased to 30% by age 60. As such, female LFP remains low compared to other countries in the OECD (OECD, 2017a). As expected, female LFP is even lower when a grandchild is present at home. According to ENOE 2018, only 37% of grandmothers between ages 30 and 65 participated in the labor market, representing a slight increase of six percentage points in the last decade.

Evidence suggests that the lack of family friendly policies is one of the reasons behind women's

[5]Note that 72% of women in our sample work in the informal sector, increasing the chance of having undetermined work schedules and a less stable income, in turn affecting these estimates' precision.

overall low labor market participation (Blau and Kahn, 2013; Cascio et al., 2015; Thévenon, 2016; Winkler, 2016). Nonetheless, Mexico's spending on childcare and preschool has remained at around 0.6% of the GDP in the last decade, averaging 900 USD per child 0 to 6 years old, compared to the OECD average of 4600 USD.[6] Consequently, in Mexico only 4% of working mothers' children ages 0 to 6 years are enrolled in a public or private formal childcare institution. Naturally, 75% of children ages 0 to 6 are cared for by their mothers and 13% by their grandmothers, regardless of mother's own employment status. Moreover, grandmothers care for 55% of working mothers' children, and 90% of those do so for at least four hours a day. Finally, close to 88% of grandmothers involved in informal childcare do not receive financial support or payment for this work.[7]

In Mexico, preschool participation (ages 3 to 5) is relatively high (71.8%), while elementary school enrollment has reached almost every child ages 6 to 12. However, before FTS implementation, school days lasted at most four to five hours, possibly fostering the use of informal childcare networks, including grandparents. The low access to formal childcare in Mexico can potentially also affect grandmothers' decisions to participate in the labor market. Therefore, the FTS program offers an ideal setup for analyzing changes in labor supply in the context of low public investment and low female participation in the labor market.

2.1 The Full-Time Schools Program

Since 2007, the FTS program has been implemented in more than 25% of elementary schools all over Mexico. It aims to improve learning opportunities in elementary education by extending the school day from four-and-a-half to eight hours. The program's secondary objective is to increase

[6] These numbers are expressed in constant 2015 dollars and are according to the latest figures in the OECD Family database downloaded in April 2020.

[7] Data on childcare coverage, grandmothers' provision of childcare, and payments come from the Survey on Employment and Social Security in Mexico (ENESS, 2017).

female participation in the labor market and support families headed by single mothers (SEP, 2010, p.3). The FTS program invested approximately 400 million USD per year from 2007 to 2018.[8]

Schools selected for the program should have certain characteristics. The most relevant to this study are the following: (a) schools have minimum infrastructure requirements (e.g. space for the construction of a kitchen and computer classrooms and for sports infrastructure), (b) schools do not operate two shifts (40% of primary schools in Mexico offer classes for different children in the morning and in the afternoon), and (c) schools in poorer areas are preferred. Although these were federal guidelines and states kept their autonomy to select the schools for the program, causing a source of variation among participating schools. Section 4 discusses how our identification strategy deals with potential confounding factors.

The FTS program was first implemented in 500 schools located in half of the Mexican states; and by the 2017-2018 academic year, the program was instated in over 25,000 schools (about 25% of all elementary schools) across Mexico. Figure 1 describes the predicted share of FTS seats in the municipalities from 2007-2008 to 2017-2018 academic years. By 2018, FTS were present in all of Mexico's 32 states and in more than 81% of the municipalities (1,670 out of 2,456). This gradual adoption of the program, across and within states, is the main source of variation used in our identification strategy.

3 Data

We use data from ENOE, a nationally representative rotating panel of approximately 110,000 households per wave offering information on LFP, formal and informal employment, earnings, and other characteristics, such as age and education of all individuals ages 15 and older. In this panel,

[8]For further details of the FTS program see Cabrera-Hernández (2019) and Padilla-Romo (2015).

20% of the sample rotates, and each household remains for five quarterly survey waves. ENOE is available since the first quarter of 2005 and, our sample includes up to the third quarter of 2018. We complement this information with administrative information on the FTS program from the Ministry of Education, which identifies whether and when schools adopted the FTS program. We also use data from the National Council of Population denoting each school's socioeconomic context. We merge all our data sets at the municipality level.

Our analytical sample consists of a dynamic panel of inter-generational households and includes families with working-age grandmothers co-residing with their adult offspring and their elementary-school-age grandchildren. This arrangement represents approximately 16% of all households in ENOE. Our specific sub sample of interest focuses on households in which there is a young child (ages 6 to 12) potentially affected by the school day's extension or approximately 45,000 households (41%) of the ENOE sample per wave. In sum, our analytical sample includes almost 45,000 grandmothers who co-resided with their grandchildren between the first quarter of 2005 and the third quarter of 2018.

We consider that grandmothers in inter-generational households are the group of women most likely to benefit from longer school schedules, because in the absence of the policy, grandmothers co-residing with working mothers and their grandchildren have a higher chance to be caregivers. Thus, we observe information not only on different measures of labor supply, individual and grandchildren characteristics, but also measures of exposure to the FTS program in those grandmothers' municipality of residence.

Our primary labor outcomes are grandmothers' LFP, employment in the formal and informal markets, hours worked, and earnings. We identify grandmothers using the variable of the rela-

tionship to the head of the household.[9] Importantly, ENOE has information on grandmothers' municipality of residence, which we use to match with our measure of exposure to full-time schools. One limitation of this data is that it is not feasible to identify grandmothers when they are not residing in grandmother-grandchild households; therefore, we do not include them in our sample.[10]

Our variable of interest is the predicted share of available FTS seats in a municipality in a given year-quarter. To construct this measure, we use the Ministry of Education's administrative records (collected annually at the beginning of the academic year) on school enrollment from 2001 to 2018 and participation in the FTS program. Following Padilla-Romo and Cabrera-Hernández (2019), we calculate each municipality's predicted share of available seats in full-time schools in a given year-quarter as follows:

$$FTS_{my} = \frac{\sum_{s \in m} \bar{e}_s FT_{sy}}{\sum_{s \in m} \bar{e}_s} \tag{1}$$

where $\bar{e}_s$, our proxy for school capacity, is the pre-program (2001-2006) average enrollment of school s; and FT_{sy} is a dummy variable indicating whether school s has adopted the FTS program in year y or earlier.[11] Figure 1 panels (a) through (d) show the geographic and temporal distribution of the FTS program's expansion. The FTS program started in the 2007-2008 academic year in 15 states. In the 2017-2018 academic year, the program reached all 31 states and Mexico City, when on average 26% of students were enrolled in full-time schools and 118 municipalities had reached universal coverage. Notably, there is both across- and within-state variation in exposure to full-time schools. We exploit both sources of variation in our identification strategy.

[9] First, we identify households with elementary-school-age children. Second, we identify grandmothers in one of two ways: (a) a household head related to a grandchild or (b) a mother or mother-in-law related to the household head.

[10] While we are unable to identify this group of grandmothers, we analyze a sample of women who are likely to be grandmothers, ages 45 to 64.

[11] While enrollment is measured in academic years, labor outcomes are measured quarterly; consequently, we split academic years into quarters. For example, we match our measure of exposure to FTS of the 2010-2011 academic year to labor outcomes during the last quarter of 2010 and the first three quarters of 2011.

Table 1 summarizes the variables used in our main analysis separately for grandmothers residing in municipalities where the predicted share of available seats in full-time schools is below or above the median—denoted as low and high intensity of treatment, respectively. On average, women in high-intensity-treatment municipalities are older, have higher levels of education, are more likely to participate in the labor market, and have higher earnings than grandmothers in low-intensity-treatment municipalities, highlighting the importance of controlling for women's observed and unobserved heterogeneity.

4 Identification Strategy

We estimate the effects of longer school days on grandmothers' labor supply using a difference-in-differences approach, which leverages within-individual variation in changes in the availability of FTS, as defined in Equation 1. Intuitively, grandmothers with elementary-school-age grandchildren, living in municipalities with a high concentration of FTS are in a better position to benefit from the extended school day, increasing their labor supply, while women in municipalities with a low concentration are not.

Given that schools are incorporated into the FTS program every academic year, our treatment variable changes only once during the five-quarter period each grandmother is observed. Therefore, we only use the variation in labor outcomes from the first and fifth ENOE waves with a long-difference model. Specifically, our baseline model is given by the following equation:

$$\Delta_4 Outcome_{imt} = \Delta_4 FTS_{mt}\delta + \eta_{st} + \Delta_4 u_{imt} \tag{2}$$

where $Outcome_{imt}$ denotes either an indicator variable of whether grandmother i in municipality m at year-quarter t participates in the labor market, her employment status in the formal or

informal sector, the number of hours worked per week, or the log of earnings per month; FTS_{mt} is the predicted share of seats in FTS in municipality m at year-quarter t; η_{st} are state-by-year-quarter fixed effects; u_{imt} is an error term that we allow to be correlated within municipalities; and Δ_4 denotes the four-period difference operator (e.g., $\Delta_4 FTS_{mt} = FTS_{mt} - FTS_{mt-4}$), which is the long-difference from the first to the fifth wave during which each woman is observed. This long-difference specification allows us to control for time-invariant individual unobserved heterogeneity and state-specific time-varying shocks to the grandmothers' labor supply. The coefficient of interest (δ) can be interpreted as the cumulative effect of going from no coverage to universal coverage of full-time schooling on the change in labor supply over the five survey waves during which grandmothers are observed.

In some specifications, we control for birth cohort-by-year-quarter fixed effects, whereby we identify δ by comparing changes in labor outcomes among women in municipalities with a high share of predicted FTS seats to the changes among women born in the same cohort in the remaining municipalities. We also control for additional education heterogeneity by including education-by-time fixed effects in the model. Finally, we control for differences among women with the presence of younger children at home by including age of the youngest child-by-time fixed effects.

For δ to have a causal interpretation, we assume that absent the FTS program, changes in grandmothers' labor outcomes in municipalities with a high concentration of FTS would have been similar to those in municipalities with a lower concentration of FTS in the same state. We provide empirical evidence that this assumption is reasonable in our setting. Specifically, we include lead terms for one year and two years before treatment in Equation 2 as a placebo exercise. We also show that our estimates are robust to the inclusion of observed characteristics impacting women's decisions to participate in the labor market, such as, education and age of the youngest child in

the household. Finally, we show that changes in the availability of full-time schools do not affect the labor outcomes of grandmothers without elementary school age grandchildren, who should not be directly affected by the extension of the school day.

5 Results

Table 2 contains the estimates of the effects of changes in availability of full-time schools on grandmothers' changes in labor supply at the extensive margin. Panels A and B present estimates of LFP and employment, respectively. The estimates in Column 1 present our baseline specification represented by Equation 2, which controls for state-by-year-quarter fixed effects. In Column 2, we also control by birth cohort-by-year-quarter fixed effects. In Column 3, we present our preferred specification, which additionally controls for education-by-year-quarter fixed effects and age of the youngest child in the household-by-year-quarter fixed effects. In columns 4 and 5, to support our identification strategy, we add future changes in the availability of full-time schools as a placebo exercise.

Regardless of the specification, our estimates indicate that increases in the availability of FTS seats in a municipality increase grandmothers' LFP and employment. In particular, our preferred specification, in Column 3, indicates that going from no coverage to universal coverage of FTS increases LFP and employment by 13.7 and 12.2 percentage points, respectively. To put these estimates in context, panels (a) and (b) of Figure 2 show LFP and employment trends relative to the largest increase in the FTS' availability. On average, the size of this increase is roughly 13 percentage points, translating into increases in grandmothers' LFP and employment of about 1.8 and 1.6 percentage points, respectively.

A back-of-the-envelope calculation based on our preferred estimation suggests that by 2018,

the availability of FTS increased the number of grandmothers participating in the labor market by 94,174 while the number of children enrolled in FTS increased to 3.5 million. In other words, in municipalities where the number of seats in FTS grew by 100, 2.7 more grandmothers entered the labor market.[12] Our estimates are economically and statistically significant, and are robust to different specifications. Moreover, the point estimates for future exposure to the FTS program, in Table 2 columns 4 and 5, are not statistically significant and close to zero, lending support to our identifying assumption.

Table 3 panels A and B show the estimated effects on weekly hours worked and the log of monthly earnings. These estimates are less robust and have wide confidence intervals. Therefore, our model is unable to derive any conclusions about the effects on hours worked and on earnings. For our preferred specification in Column 3, we see positive and economically significant point estimates although they are indistinguishable from zero. However, it is worth mentioning that 72% of employed women in our sample are employed in the informal sector, increasing the chance of a higher variation in work schedules and less stable earnings. This variation may affect the precision of our estimations.[13]

Our main analysis examines grandmothers living with their grandchildren. Offering indirect evidence of the potential effects on all grandmothers, Appendix Table A1 presents the aggregate results for all women ages 45 to 64. While we cannot directly identify if women in this group have a grandchild or if they live in the same municipality, we assume that some of these women have

[12]These numbers are calculated using the regression coefficient from Column 3, Panel A in Table 2, the 2018 population projections from CONAPO, the share of grandmothers with school-age grandchildren, and the share of schools incorporated to the FTS program. That is, 49.1 million women are 15 and older, with 5.6% living in a grandparent-grandchild household, and 3.425% of those women participating in the labor market when 25% of schools in Mexico have adopted the FTS program (0.25 X 0.137).

[13]In Subsection 5.3, the effects on formal and informal employment are presented.

a higher probability of being grandmothers. The results also show and increase of 4.5 percentage points for both LFP and employment.

When assuming equal counterfactual trends, two-way fixed-effects (TWFE) models are common for estimating causal effects based on panel data as an equivalent of the "canonical" difference-in-differences estimator (DD) with two time periods and two groups (2-by-2). However, recent research has shown that the equivalence between difference-in-differences and TWFE estimators in more typical settings, with variation in the time of treatment, does not always hold (see Goodman-Bacon, 2018; Abraham and Sun, 2018; Callaway and Sant'Anna, 2019). Particularly, Goodman-Bacon (2018) derives the DD estimator and shows (a) how it is a weighted average of all possible 2-by-2 DD estimations and (b) that the treatment effect heterogeneity across different groups of treatment and control—particularly when the effects change over time—biases the estimations.

Goodman-Bacon (2018) also provides a useful strategy to decompose the biases coming from different treatment and control groups (early versus late and never treated); however this decomposition only works for binary treatments and balanced panels. In our setting of different exposures to a higher or lower presence of FTS seats and a rotating panel of households, we aim to address such concerns by using our preferred specification to obtain the overall results after excluding all predicted FTS seats added in each corresponding year. That is, we set enrollment in FTS first incorporated into the program in a given year ($y \in 2007, 2008, ..., 2017$) to zero and re-estimate our preferred specification. The intuition is that if a specific cohort of FTS schools has an average higher/lower effect on grandmothers' labor outcomes across time, its exclusion would considerably change the overall coefficient downwards/upwards. Figure 3 shows the average effects after excluding each year's contribution of the FTS seats to our predicted share in each academic year between 2007 and 2017. The results in panels (a) and (b) largely support our overall results on LFP and

employment as point estimates remain statistically similar, while the results on earnings and hours worked remain large and undetermined.

5.1 Grandfathers and Other Grandmothers

Thus far, we have found evidence that extending the school day increased LFP and employment for grandmothers with elementary-school-age grandchildren. It is possible that this implicit childcare subsidy also affects grandfathers. Table 4, columns 1 to 4, present the estimated effects using our preferred specification on LFP, employment, hours worked per week, and the log of earnings per month for grandfathers with elementary-school-age grandchildren—respectively. Although less precise, the estimated effects are not statistically significant, suggesting that childcare's availability does not affect the labor supply of grandfathers residing in grandfather-grandchild households.

Supporting our main results, Table 5 also uses our preferred specification to explore the effects on labor outcomes in a sub-sample of grandmothers who should not be directly affected by the change in FTS availability, namely, grandmothers without elementary-school-age grandchildren (ages 6 to 12). Intuitively, if our estimations are holding other changes in labor markets constant, we should not see significant coefficients for this group of women. Columns 1 through 4 of Table 5 show estimated effects close to zero and statistically non-significant, offering support to our identification strategy.

Based on overall effects on grandfathers and on grandmothers without school-age children, we conclude that grandmothers are the main caregivers and that the effects on women we identify are not driven by overall labor market trends in affected municipalities.

5.2 Treatment Effect Heterogeneity

One can imagine that women with more human capital or in areas with a more dynamic labor market on average could be more affected by the extension of the implicit childcare because their opportunity costs are higher. Conversely, women with higher economic restrictions may have more incentives to participate in the labor market to ease their budget constrains. To explore these possibilities, we allow our main estimates to differ by education and poverty levels by interacting our treatment variable with dummy variables indicating levels of education and poverty below or above the median.

Table 6, Panel A shows the main results based on our preferred specification for the overall sample. Panels B and C show treatment effects for women with education and poverty levels below and above the median. While the effects are not clearly identified for the employment of more educated women and women in low poverty areas, our estimations suggest that effects on LFP and employment are similar to the overall effects and of the same magnitude for women with higher or lower levels of education and poverty.

5.3 Employment and Informality

In Mexico, female informal employment accounts for more than half of the total employment. On average, 57% of women are employed in the informal sector, accounting for 72% in our sample of grandmothers. This level of informal employment represents an important challenge for labor institutions because most grandmothers would have no access to formal pension schemes nor social security. This large proportion of informal workers motivates us to explore whether free childcare through longer school days contributes to formal employment.

Figure 4 shows the estimated coefficients of our preferred specification separated by formal and

informal employment and by grandmothers' education level. Figure 5 does the same by poverty level. Based on these figures, we can conclude that despite FTS' availability, the overall effects are driven by changes in employment for low-educated grandmothers in the informal sector. Moreover, the effects on formal employment are close to zero and statistically non-significant for grandmothers in both richer and poorer localities. These findings are evidence that while childcare provision may increase female participation, precariousness in the labor market may still limit those grandmothers' potential earnings and lifetime savings.

6 Discussion of Results

Our analysis provides quasi-experimental evidence that publicly provided childcare through extended school days in elementary schools increases LFP and employment for grandmothers living with their grandchildren. The effects we found are not only economically and statistically significant but also robust to different specifications and to the exclusion of each cohort of FTS. Under our preferred specification, we estimate that a 13 percentage point increase in the availability of FTS, the largest average expansion we observe, increases LFP and employment by 1.8 and 1.6 percentage points, respectively. The results are mainly driven by grandmothers employed in informal markets.

Our results complement the evidence for other developed and developing countries regarding the provision of childcare and mothers' and grandmothers' labor outcomes (Berthelon et al., 2015; Cascio et al., 2015; Thévenon, 2016; Ho, 2015a; Lin and Wang, 2017; Du et al., 2019), generally showing increases in their average participation in the labor market. This literature has largely supported childcare provision. We provide evidence of its importance for older women in the context of low female labor force participation and budget-constrained families. Nonetheless, it

is noteworthy that for grandmothers—in the context of large informality in the labor market—childcare provision may be insufficient to improve their life-cycle earnings and savings.

Finally, our estimations shed light on the effectiveness of FTS programs. For the case of Mexico, the FTS program has had positive effects on mothers' LFP, hours worked, employment and earnings (Padilla-Romo and Cabrera-Hernández, 2019), which in addition to the findings presented here, they represent a boost in female labor outcomes that may translate to more women's participation in the economic progress. Moreover, results for developing countries have suggested a positive impact of these programs on children test scores; reducing the knowledge gap between poorer and richer schools; delaying teenage pregnancy; and improving the quality of working mothers' jobs (Bellei, 2009; Kruger and Berthelon, 2009; Padilla-Romo, 2015; Cabrera-Hernández, 2019; Berthelon et al., 2020). While these programs' high cost has been openly debated (see Alfaro et al., 2015), their benefits must include full-time schools' broader range of social effects, including increases in grandmothers' labor supply.

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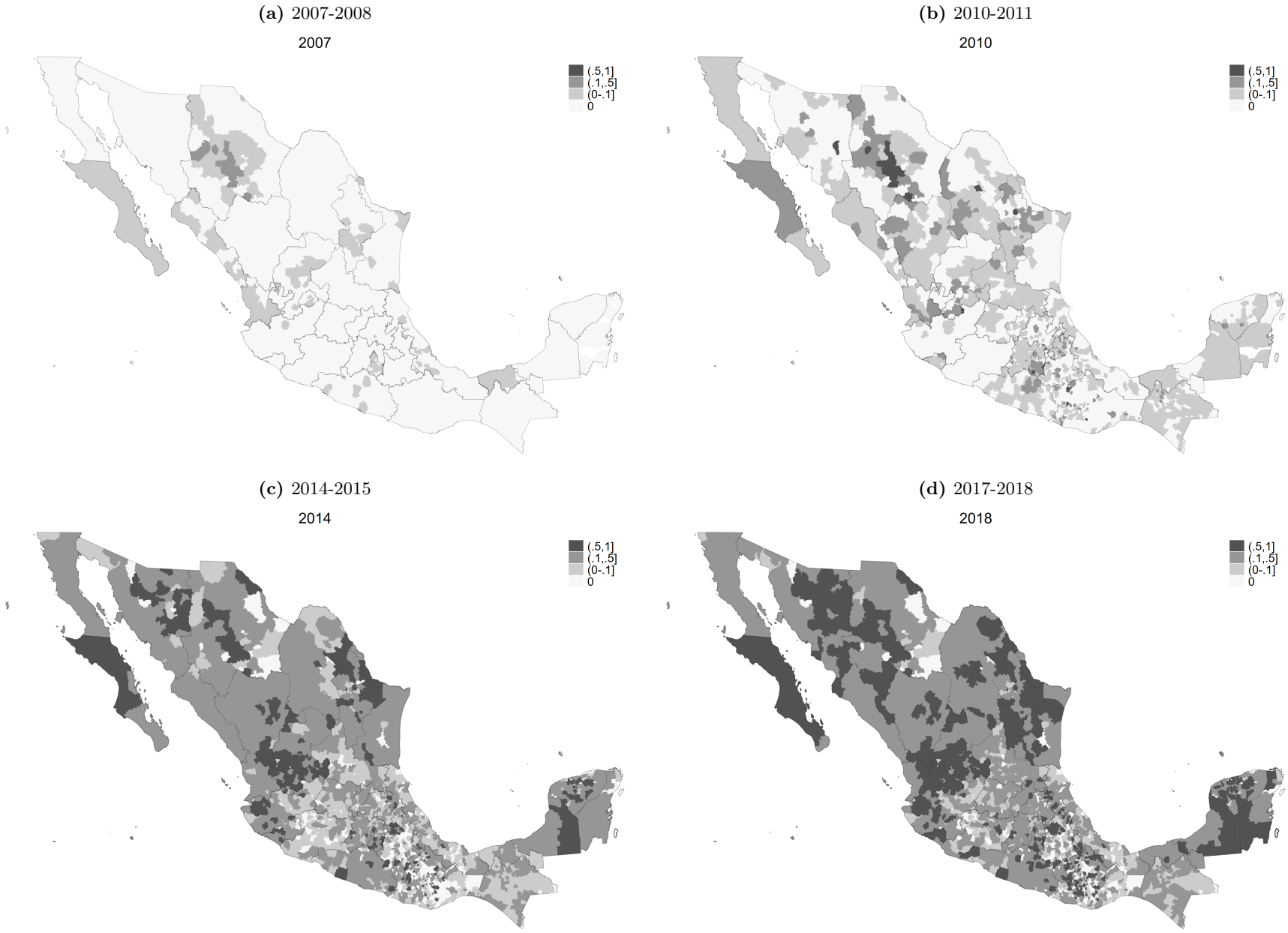
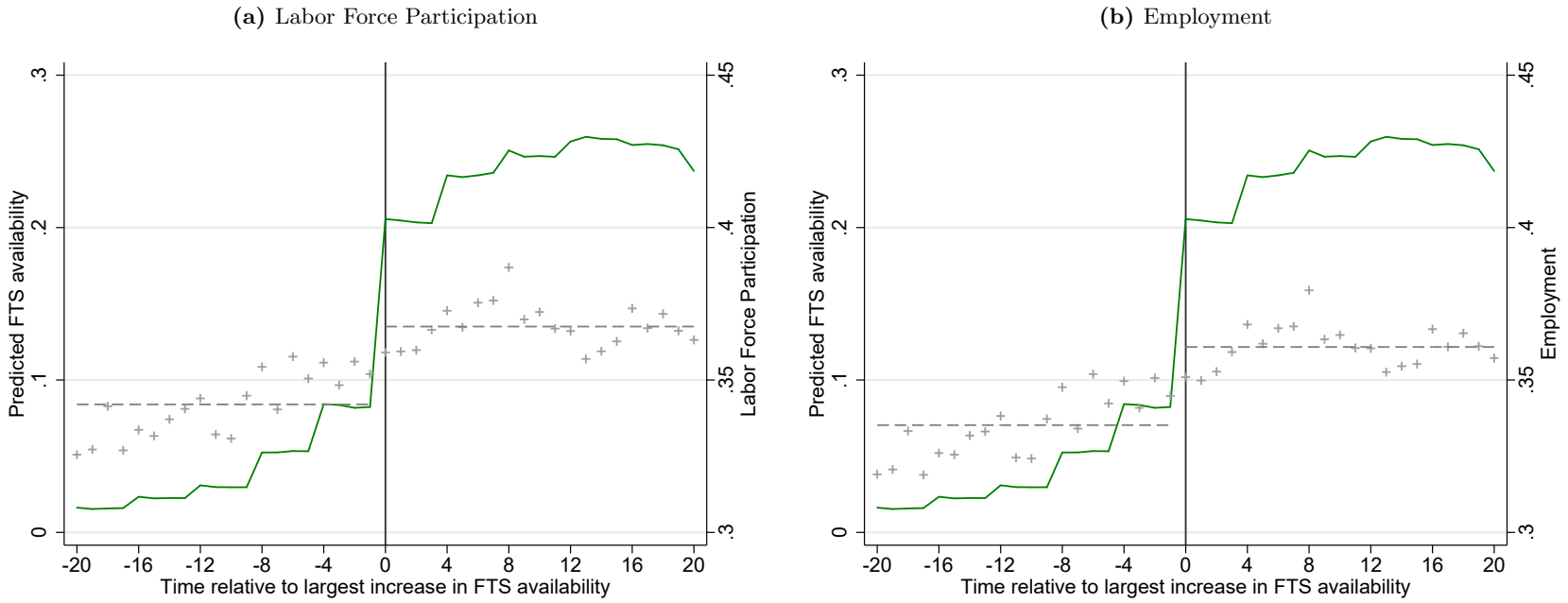
Figure 1: Predicted Share of FTS Seats by Academic Year



Notes: Each panel separately shows the geographic distribution of municipalities' predicted share of FTS seats in a given academic year. Predicted shares of FTS seats were constructed using annual school-level census data on enrollment and participation in the FTS program from the Ministry of Education.

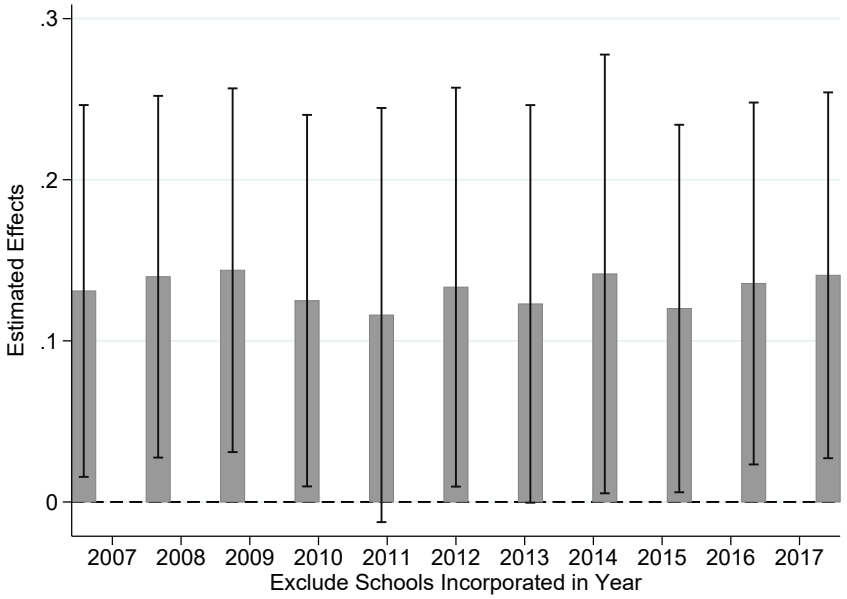
Figure 2: FTS Availability and Grandmothers' LFP and Employment



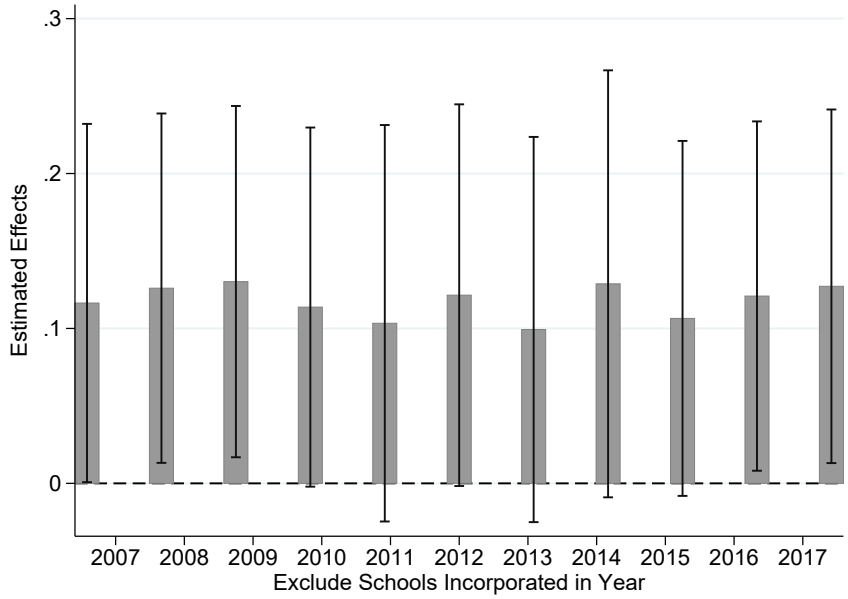
Notes: The solid green line shows the average predicted share of FTS seats and the + marks show the average LFP and employment. Time zero represents the year-quarter with the maximum increase in FTS availability in a municipality, being 13 percentage points the average largest increase. Panels (a) and (b), respectively, report the average grandmothers' LFP and employment for each year-quarter before and after the largest increase in FTS availability in a municipality.

Figure 3: Overall Effects Excluding FTS Predicted Seats in Each Corresponding Year

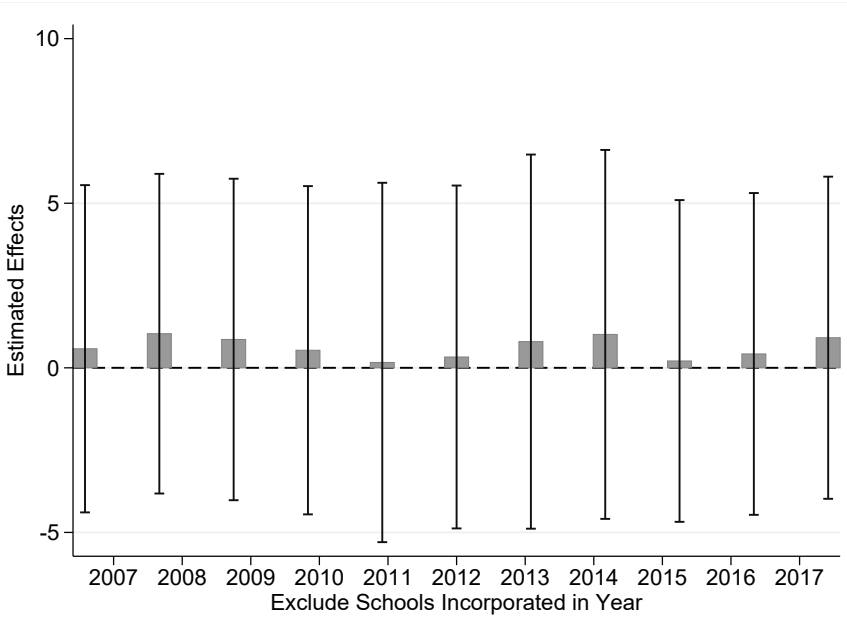
(a) LFP



(b) Employment



(c) Weekly Hours Worked



(d) Log of Monthly Earnings

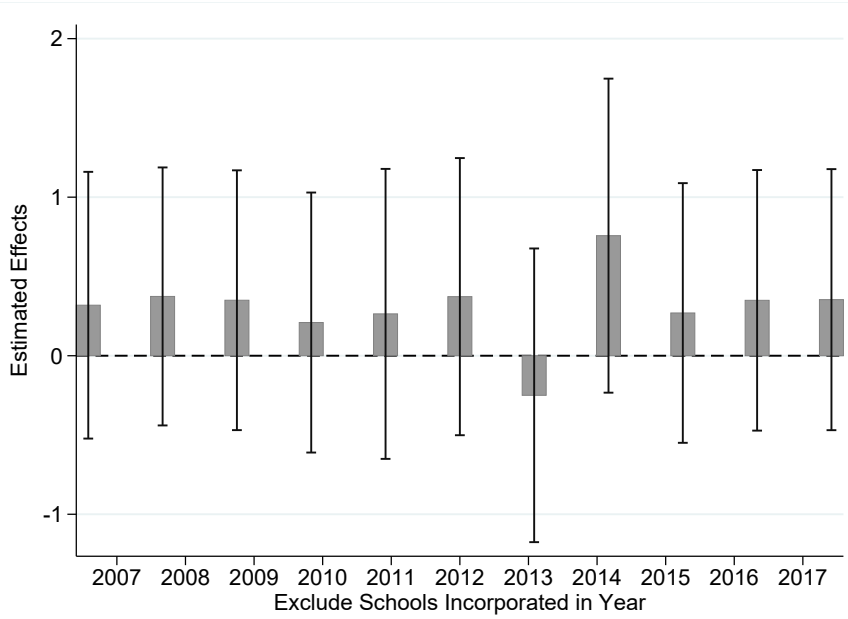
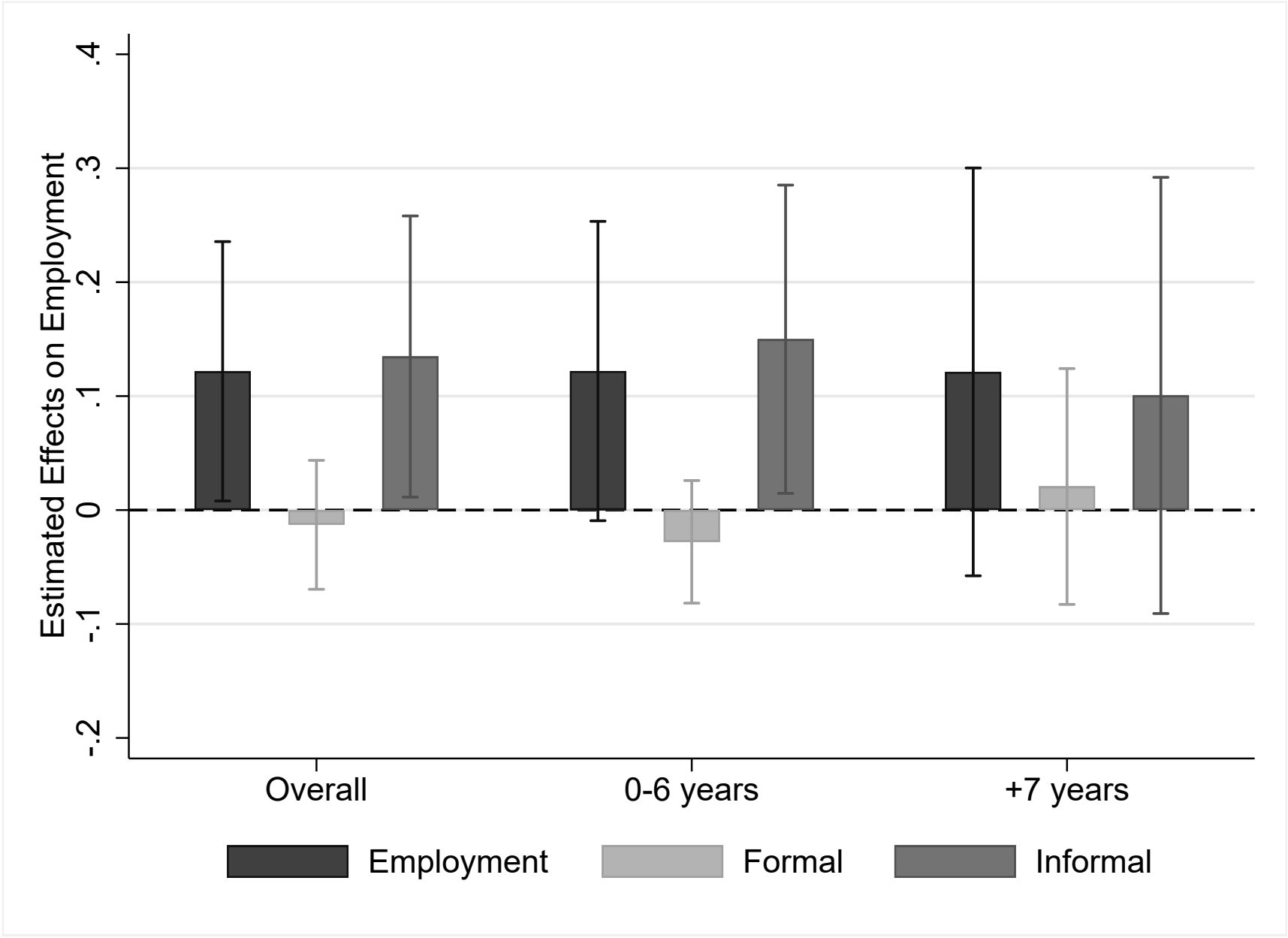
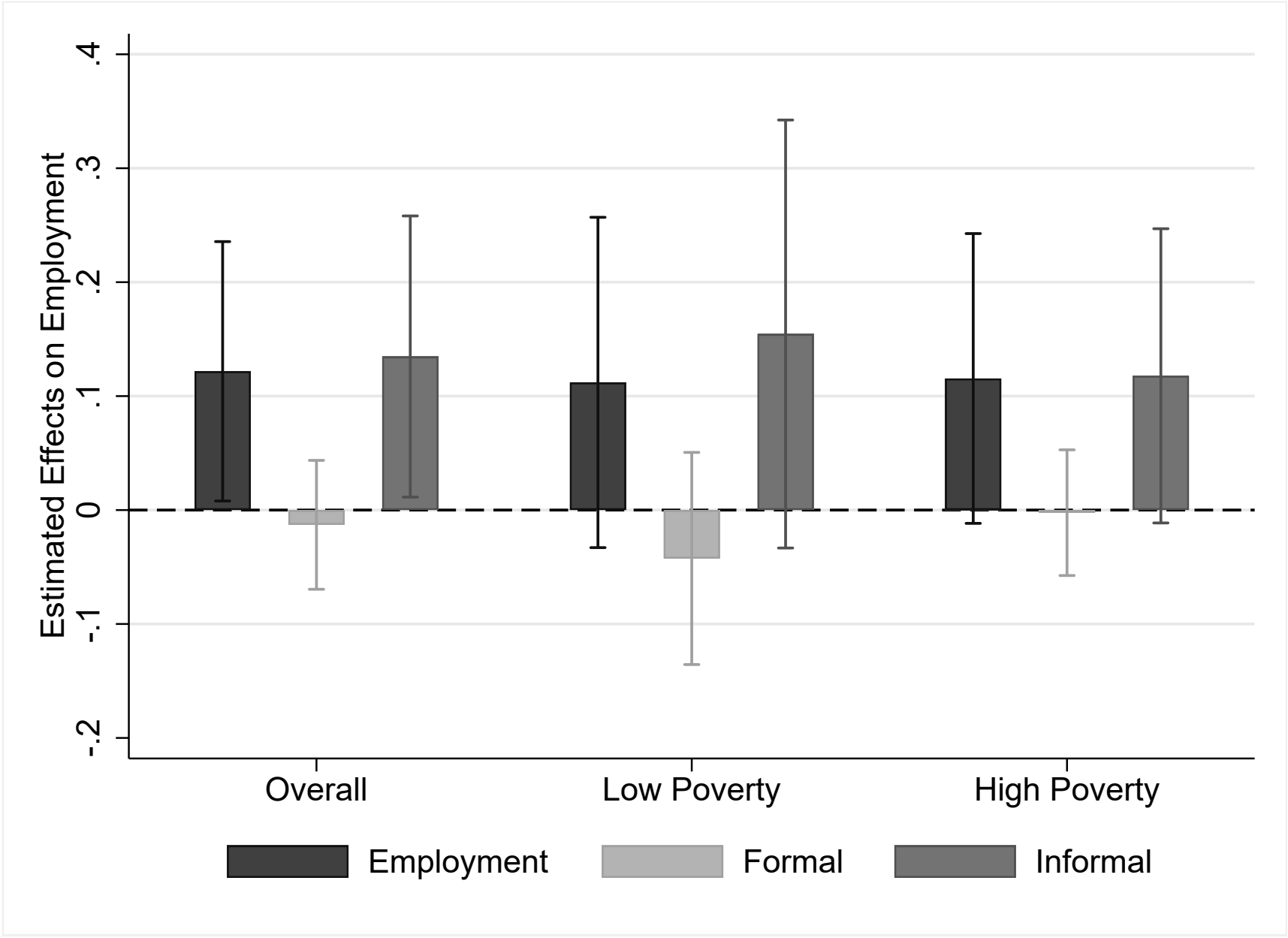


Figure 4: Estimated Effects on Formal and Informal Employment by Education Level



Notes: All estimations include state-by-time, cohort-by-time, education-by-time, and the age of the youngest child-by-time fixed effects. The median education level in our sample of grandmothers is 6 years, which correspond to finished elementary school.

Figure 5: Estimated Effects on Formal and Informal Employment by Poverty Level



Notes: All estimations include state-by-time, cohort-by-time, education-by-time, and the age of the youngest child-by-time fixed effects. Low and high poverty municipality are defined as those with a poverty index below or above the median.

Table 1: Summary Statistics by Intensity of Treatment

	Low Intensity		*High Intensity*		*Difference*
	Mean	Std.Dev.	Mean	Std.Dev.	
Age (years)	52.21	(6.95)	52.44	(6.74)	-0.23
Education (years)	5.24	(3.86)	6.51	(3.90)	-1.27
# of Children aged 0-15	2.46	(1.35)	2.30	(1.22)	0.15
Age of the youngest child (years)	4.50	(3.51)	4.73	(3.51)	-0.23
LFP	0.40	(0.49)	0.44	(0.50)	-0.04
Employment	0.40	(0.49)	0.43	(0.50)	-0.04
Formal Employment	0.11	(0.31)	0.13	(0.34)	-0.02
Informal Employment	0.29	(0.45)	0.30	(0.46)	-0.02
Weekly Hours Worked	14.01	(21.37)	15.14	(21.66)	-1.13
Monthly Earnings (2018 pesos)	1466.09	(3360.02)	1558.80	(3513.41)	-92.71
Predicted Share of Students in FTS	0.01	(0.01)	0.22	(0.18)	-0.22

Notes: This table reports the mean and standard deviation for labor outcomes and women characteristics from ENOE, separately for grandmothers above and below the median (*low intensity/ high intensity*) share of predicted seats in FTS at the baseline (first survey wave).

Table 2: Estimated Effects on LFP and Employment

	(1)	(2)	(3)	(4)	(5)
Panel A: Labor Force Participation					
Fraction of Students in FTS	0.120**	0.121**	0.137**	0.149**	0.156**
	(0.053)	(0.054)	(0.058)	(0.059)	(0.061)
Lead 1				0.009	0.003
				(0.051)	(0.052)
Lead 2					-0.001
					(0.054)
N	44771	44691	44495	40795	37253
Panel B: Employment					
Fraction of Students in FTS	0.112**	0.111**	0.122**	0.133**	0.139**
	(0.054)	(0.055)	(0.058)	(0.059)	(0.061)
Lead 1				-0.005	-0.009
				(0.051)	(0.052)
Lead 2					-0.016
					(0.053)
N	44771	44691	44495	40795	37253
Cohort-by-time fixed effects	No	Yes	Yes	Yes	Yes
Education-by-time fixed effects	No	No	Yes	Yes	Yes
Youngest-by-time fixed effects	No	No	Yes	Yes	Yes

Notes: Each column in each panel represents a different regression. All estimations include state-by-time fixed effects. Standard errors in parentheses are clustered at the municipality level.
*, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

Table 3: Estimated Effects on Weekly Hours Worked and Monthly Earnings

	(1)	(2)	(3)	(4)	(5)
Panel A: Weekly Hours Worked					
Fraction of Students in FTS	-0.004	0.056	0.671	0.941	0.345
	(2.359)	(2.417)	(2.478)	(2.535)	(2.613)
Lead 1				2.574	2.464
				(2.131)	(2.154)
Lead 2					-1.522
					(2.036)
N	44771	44691	44495	40795	37253
Panel B: Log of Monthly Earnings					
Fraction of Students in FTS	0.346	0.251	0.371	0.416	0.582
	(0.370)	(0.386)	(0.413)	(0.421)	(0.438)
Lead 1				-0.326	-0.318
				(0.442)	(0.450)
Lead 2					0.365
					(0.400)
N	44771	44691	44495	40795	37253
Cohort-by-time fixed effects	No	Yes	Yes	Yes	Yes
Education-by-time fixed effects	No	No	Yes	Yes	Yes
Youngest-by-time fixed effects	No	No	Yes	Yes	Yes

Notes: Each column in each panel represents a different regression. All estimations include state-by-time fixed effects. Standard errors in parentheses are clustered at the municipality level.
*, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

Table 4: Estimated Effects on Labor Outcomes:
Grandfathers with Elementary School-Age Children

	LFP	Employment	Hours Worked	Log Earnings
	(1)	(2)	(3)	(4)
Overall	-0.014	-0.026	-3.166	0.199
	(0.061)	(0.067)	(4.381)	(0.843)
N	25776	25776	25776	25776
Cohort-by-time fixed effects	Yes	Yes	Yes	Yes
Education-by-time fixed effects	Yes	Yes	Yes	Yes
Youngest-by-time fixed effects	Yes	Yes	Yes	Yes

Notes: Each column in each panel represents a different regression. All estimations include state-by-time fixed effects. Standard errors in parentheses are clustered at the municipality level.
*, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

Table 5: Estimated Effects on Labor Outcomes:
Grandmothers without Elementary School-Age Children

	LFP	Employment	Hours Worked	Log Earnings
	(1)	(2)	(3)	(4)
Overall	-0.004	-0.016	0.185	0.220
	(0.072)	(0.073)	(2.721)	(0.568)
N	28434	28434	28434	28434
Cohort-by-time fixed effects	Yes	Yes	Yes	Yes
Education-by-time fixed effects	Yes	Yes	Yes	Yes
Youngest-by-time fixed effects	Yes	Yes	Yes	Yes

Notes: Each column in each panel represents a different regression. All estimations include state-by-time fixed effects. Standard errors in parentheses are clustered at the municipality level.
*, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

Table 6: Estimated Effects on Labor Outcomes by Poverty and Education

	LFP (1)	Employment (2)	Hours Worked (3)	Log Earnings (4)
Panel A: Overall				
Overall	0.137**	0.122**	0.671	0.371
	(0.058)	(0.058)	(2.478)	(0.413)
N	44495	44495	44495	44495
Panel B: Education				
Below Median	0.130*	0.122*	1.355	0.433
	(0.067)	(0.067)	(2.839)	(0.463)
Above Median	0.152*	0.121	-0.870	0.232
	(0.089)	(0.091)	(3.827)	(0.741)
N	44495	44495	44495	44495
Panel C: Poverty				
Low Poverty	0.112	0.112	-1.621	-0.409
	(0.076)	(0.074)	(3.014)	(0.575)
High Poverty	0.137**	0.115*	1.358	0.711
	(0.065)	(0.065)	(2.860)	(0.457)
N	44256	44256	44256	44256
Cohort-by-time fixed effects	Yes	Yes	Yes	Yes
Education-by-time fixed effects	Yes	Yes	Yes	Yes
Youngest-by-time fixed effects	Yes	Yes	Yes	Yes

Notes: Each column in each panel represents a different regression. All estimations include state-by-time fixed effects. Standard errors in parentheses are clustered at the municipality level.
*, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

Appendix A

Table A1: Estimated Effects on Labor Outcomes:
All women ages 45 to 64

	LFP	Employment	Hours Worked	Log Earnings
	(1)	(2)	(3)	(4)
Fraction of Students in FTS	0.045**	0.045**	1.247	0.462***
	(0.019)	(0.019)	(0.825)	(0.167)
N	322006	322006	322006	322006
Cohort-by-time fixed effects	Yes	Yes	Yes	Yes
Education-by-time fixed effects	Yes	Yes	Yes	Yes

Notes: Each column in each panel represents a different regression. All estimations include state-by-time fixed effects. Standard errors in parentheses are clustered at the municipality level.
*, **, *** Significant at the 10%, 5%, and 1% levels, respectively.