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Who Works Less when a Parent Needs Long-Term Care? Gender Disparities in Labor Market Effects in Mexico

RESEARCH

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ABSTRACT

We use longitudinal data from the Mexican Health and Aging Study to analyze the effect of having a parent in need of long-term care on labor supply of men and women aged 50–64 in Mexico. After accounting for both individual and time fixed effects, we find that parents' need of long-term care is associated with both a significant drop in the likelihood of working (by 2.42 percentage points), and a reduction in the number of hours worked (by 7.3%) among women who remain employed. In contrast, we find no effect on the labor supply of men. In a context of rapid population aging, the increase in the need of long-term care risks to hinder the efforts to reduce gender imbalances in the labor market.

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1. INTRODUCTION

In Latin America and the Caribbean, in 2015 there were about 8 million people older than 60 living in a situation of care dependence, i.e. experiencing difficulties in completing basic activities of daily living like dressing, bathing, or eating. This figure is estimated to grow to 27 million by 2050 (Aranco et al., 2018). In Mexico, the number of persons aged 60 and over in a situation of care dependence was estimated at 3 million in 2018 (Ibarrarán et al., 2021), and is also expected to increase in the future. Dependent persons rely on help from others, meaning they require long-term care (LTC) services.

With a few exceptions, public LTC services are very limited in most Latin American and Caribbean countries (Aranco et al., 2022). In Mexico, public provision of LTC is practically non-existent. The social protection for older persons focuses on healthcare and pensions. Although the law establishes that families have the right to receive subsidiary support from the public sector for the care of older persons in need, with the exception of few residential and day care services, to date this has not been reflected in specific national policies or strategies. Similarly, there are no services that support family caretakers (López Ortega & Aranco, 2019).

At the same time, the markets for LTC services in the region are scarcely developed, and only the most affluent can afford them. For example, only about 0.5% of Latin American and the Caribbean older people live in nursing homes or assisted living facilities, versus over 2% in Europe or the United States (Cafagna et al., 2019). In Mexico, less than 3% of those receiving LTC at home report paying for it (González-González et al., 2019).

Given the lack of public services and the scarcity or unaffordability of private services, most of the burden of LTC falls on family members, particularly on women. Data from the 2014 Mexican time-use survey show that women provide 72% of the hours of family LTC. According to ILO (2018:p. 72), "gender inequality in unpaid care work is [...] the missing link that influences gender gaps in labor outcomes. Applying a 'care lens' to the analytical framework, in both its paid and unpaid dimensions, is essential to understanding and addressing the perpetuation of gender inequalities in the labor force." LTC is part of this missing link, a part that will grow in importance in the near future due to rapid population aging. Women who carry the burden of caregiving are likely to end up with lower employment and income. This creates "gender gaps in savings and assets, placing further restraints on women's decision-making power within households, restraining their access to social protection (including old-age pensions)" (ILO, 2018:p. 11).

In this paper, we analyze how having a parent in need of LTC affects labor supply in Mexico. Our contribution is the first to use longitudinal data from the Mexican Health and Aging Study (MHAS)[1] to estimate the effect of LTC needs on labor supply by gender while accounting for individual and time fixed effects. The first type of fixed effects adjusts for time-invariant unobserved individual characteristics (e.g., genetic characteristics that affect both parents and children's health) that may confound the relation of interest, while the second adjusts for time-varying confounders that are common across individuals (e.g., macroeconomic conditions). We analyze separately the effects on women and men's labor supply.

The remainder of the paper is organized as follows. Section 2 reviews the existing literature on informal LTC and labor supply. Section 3 describes the MHAS data. Section 4 explains our estimation methodology. Section 5 contains multivariate analysis results. The last section holds the conclusions and discusses certain policy implications.

2. EXISTING LITERATURE AND RELATIONSHIP WITH OUR RESEARCH QUESTION

Most of the related literature focuses on the labor market effects of providing LTC in high-income countries. It provides evidence of negative effects on participation in paid work (Ettner, 1995; Bolin, Lindgren & Lundborg, 2008; Leigh, 2010; Crespo & Mira, 2014; Heitmueller, 2007; Ciccarelli & Van Soest, 2018), on the number of hours worked (Johnson & Lo Sasso, 2000; Johnson & Lo Sasso, 2006; Van Houtven, Coe & Skira, 2013; Fahle & McGarry, 2017; Ciccarelli & Van Soest, 2018), and on workers' hourly wages (Carmichael & Charles, 2003; Heitmueller & Inglis, 2007). Some studies find evidence of greater labor market effects for female caregivers (generally wives or daughters) than for men (Carmichael & Charles, 2003; Johnson & Lo Sasso, 2006; Ciccarelli & Van Soest, 2018), and that LTC increases the probability of early retirement (Van Houtven, Coe & Skira, 2013).

Ciccarelli and Van Soest (2018; Table 1) present a comprehensive review of the existing literature and highlight some stylized facts. First, "studies based on cross-sectional data typically use instrumental variables. Parental health is often used to construct instruments for caregiving, with the argument that parental health has no effect on paid work other than through caregiving" (Ciccarelli & Van Soest, 2018:p. 365). Second, some longitudinal studies estimate fixed-effect models in order to account for time-invariant characteristics of both care dependent parents and caregiving children (Leigh, 2010). Third, some studies combine instrumental variables and panel data models. This is the case of Ciani (2012), Van Houtven, Coe and Skira (2013), Crespo and Mira (2014). The magnitude of the estimated coefficients is affected by the estimation methodology. Instrumental variable

	WOMEN			MEN		
VARIABLE	**OBS.**	**MEAN**	**STD. DEV.**	**OBS.**	**MEAN**	**STD. DEV.**
Employed	20,080	0.356	0.479	15,607	0.804	0.397
Hours of work per week, conditional on employment	7,227	39.754	20.595	12,591	50.052	18.182
Father or mother requires LTC	18,763	0.141	0.348	14,605	0.127	0.333
Age (years)	20,374	56.711	4.103	15,950	57.057	4.019
Age 50–54	20,374	0.348	0.476	15,950	0.308	0.462
Age 55–59	20,374	0.363	0.481	15,950	0.387	0.487
Age 60–64	20,374	0.290	0.454	15,950	0.305	0.460
Married or living with partner	19,384	0.700	0.458	15,311	0.853	0.354
Number of siblings	19,443	5.592	3.013	14,864	5.606	3.051
Excellent or regular health status	19,348	0.883	0.322	14,393	0.920	0.272
Regular or poor economic status	19,311	0.754	0.431	14,357	0.756	0.429
No schooling	20,125	0.156	0.363	15,776	0.109	0.312
Did not complete primary schooling	20,125	0.262	0.440	15,776	0.258	0.438
Completed primary schooling	20,125	0.219	0.414	15,776	0.223	0.416
Completed secondary schooling	20,125	0.282	0.450	15,776	0.265	0.441
Completed tertiary schooling	20,125	0.081	0.273	15,776	0.145	0.352
Year = 2001	20,374	0.147	0.354	15,950	0.155	0.362
Year = 2003	20,374	0.128	0.334	15,950	0.130	0.336
Year = 2012	20,374	0.245	0.430	15,950	0.266	0.442
Year = 2015	20,374	0.193	0.395	15,950	0.184	0.388
Year = 2018	20,374	0.288	0.453	15,950	0.265	0.441

Table 1 Pooled 2001–2018 MHAS Descriptive Statistics, Women and Men Aged 50–64.
Source: Authors' calculations based MHAS data.

models tend to produce estimated effects that are larger in magnitude than those from Ordinary Least Squares (OLS) models.[2] In contrast, fixed effect estimates tend to be smaller than those obtained through random effect or pooled OLS models.

Our study is the first to focus on an emerging country. It differs from the existing literature in that we explore the effect of a parent's need of LTC on labor supply, rather than the effect of actually providing care. This has two motivations. First, drawing causal inferences on the labor supply effect of "having a parent in need of LTC" instead of "providing LTC" is relatively easier, because the former variable is not as susceptible to endogeneity as the latter. "Providing LTC" is an endogenous decision by an individual, while "having a parent in need of LTC" is not an individual choice and may in some instances be the result of an exogenous event (e.g., a fall). Second, as the number of care dependent older persons is expected to increase significantly in the coming years, it is important to consider the overall effect of "having a parent in need of LTC" on labor supply. This overall effect encompasses *all* possible channels and explanations how having a parent in need of LTC may affect labor supply. One of these channels is that the children may decrease labor supply to provide LTC when having a parent that needs it. However, there are several other possible channels, such as: (1) children may increase labor supply to pay for parents' LTC and/or medical expenses, or to help support their parents economically; (2) children may decrease labor supply to increase the supply of housework that was previously done by parents; (3) children may increase labor supply to compensate for a reduction in labor provided by the parents, for example in a family business. Labor supply may increase or decrease for these reasons irrespective of the provision of LTC. By analyzing the overall effect of having a parent in need of LTC on labor supply, rather than the effect of a particular channel variable (providing LTC) on labor supply, we complement the existing literature to gain a better understanding of the possible effects of the growing number of care dependent older persons and the heavy burden carried by women.

3. DATA

The MHAS collects data on aging, health status, and the burden of disability of Mexican individuals over age 50 (Wong et al., 2015). The first wave of data was collected in 2001, with a nationally representative sample of persons born in 1951 or earlier. Follow-up surveys were conducted in 2003, 2012, 2015, and 2018. In 2012 and 2018, the sample was expanded to include new individuals and thus maintain representativeness of the Mexican population over 50.[3] We combine all the existing five waves of data to create an unbalanced panel. Our analysis is based on a sample of 20,374 women and 15,950 men ages 50 to 64. We exclude persons over the age of 65, as they have reached the legal retirement age and are therefore substantially less likely to work.

The treatment variable "having a parent in need of LTC" is equal to one if the person replied yes to either one of two questions, referred to mother and father, phrased as follows: "Due to a health problem, does your [parent] need help with basic necessities such as dressing, eating or bathing?". As for the outcomes: (a) the variable "employed" is equal to one if the person replied that she was working when asked "at the moment, are you? (1) working; (2) looking for work; (3) not working";[4] (b) the number of hours worked is the sum of the number of hours indicated for each day of the week in response to the question "normally, which days and how many hours do you spend at your primary job? (__) Monday, (__) Tuesday, (__) Wednesday, (__) Thursday, (__) Friday, (__) Saturday, (__) Sunday." Only the primary job is considered, due to lack of information in the survey on hours worked in a secondary job.[5]

Table 1 presents descriptive statistics for our MHAS sample. Women were 57 years old on average; 35.6% of them worked at the time of the survey; those who worked did so about 40 hours per week; and 14.1% of them had a parent requiring LTC. Most of the women in the sample were married or living with their partner (70%); only 36.3% had completed secondary education or higher; 88.3% classified their health status as regular or excellent; and 75.4% classified their economic situation as either regular or poor. Men had a much higher employment rate (80.4%), and, conditional on being employed, worked longer hours (50 per week); 12.7% of them had a parent requiring LTC. They were more likely to be married or living with a partner (85.3%); 41% had completed secondary education or higher; 92% classified their health status as regular or excellent; and 75.6% classified their economic situation as either regular or poor.

4. METHODOLOGY

In this paper, we employ a two-way fixed-effects model to estimate the effects of having a parent in need of LTC on labor supply. This model is widely used in the literature when analyzing the effect of a "treatment" or intervention on an outcome (e.g., Almond, 2006; Hotz & Xiao, 2011; Aaronson, Sumit & French, 2012; Bitler & Carpenter, 2016). While random-effects models have also been used in the literature when analyzing the effect of providing LTC on labor supply (e.g., Johnson & Lo Sasso, 2006), we employ the fixed-effects model for two main reasons. First, random-effects models require the unpalatable assumption that the random individual effects are independent of the covariates included in the model (e.g., Greene, 2004; Angrist & Pischke, 2009:p. 223). In our setting, this assumption is unlikely to hold as it would require that individual-level characteristics that are time invariant (e.g., personality, innate ability, and genetic predisposition to certain diseases) are uncorrelated with covariates such as health status and education (see also Footnote 2 in Johnson & Lo Sasso, 2006). Second, even if the previous assumption were to hold, for our main purpose of estimating the effect of having a parent in need of LTC on labor supply the main advantage of using a random-effects model instead of a fixed-effects model would be a gain in efficiency. However, as argued elsewhere in the literature, the gain in efficiency is unlikely to be large enough to compensate for the risk of inconsistency if the assumption is indeed invalid (e.g., Angrist & Pischke, 2009:p. 223).[6]

Using MHAS data, we estimate the following two-way fixed effect model, separately for women and men:

$$L_{it} = \beta_0 + \beta_1 \cdot LTC_{it} + \beta_2 \cdot X_{it} + \alpha_i + \delta_t + u_{it}, \quad (1)$$

where *i* and *t* are subscripts representing individuals and time, respectively. *L* represents the dependent variables: a dummy for the status of currently working, and the natural logarithm of the number of hours worked per week in the primary occupation. The equation for the number of hours is conditional on working, meaning it is only estimated for observations with a positive number of hours worked. We consider the natural logarithm of the number of hours worked to ensure normality in the distribution of the dependent variable.

LTC is the treatment variable and indicates whether the individual has a parent in need of care.[7] *X* is a vector of controls selected based on a review of prior literature. It includes: two dummies for age (50–54 years old, 55–59 years old, with 60–64 as omitted category) to account for nonlinearity; four dummies for the level of education (did not complete primary, completed primary, completed secondary, and completed tertiary; with no schooling as the omitted category); a dummy for being married or living with a partner; number of siblings; a dummy for health status, self-reported as regular or excellent; and a dummy for economic status, self-reported as poor or regular. The health and economic status of the individuals were collected through categorical answers (bad, regular,

good, very good, excellent). We transformed them into indicator variables to avoid modalities with relatively few answers.

α_i and δ_t represent individual-specific and time-specific fixed effects, respectively. The individual-specific fixed effects account for time-invariant individual characteristics that may be correlated with both the dependent variable (employment and hours worked) and the treatment variable (having a parent in need of LTC). Therefore, these fixed effects account for important potential confounders such as the individuals' personality, industriousness, innate ability, family background, and genetic predisposition to certain diseases. Importantly, these individual fixed effects also account for time-invariant characteristics of the individuals' parents that may confound our relation of interest, such as parents' education level, innate ability, and genetic predisposition to certain diseases. The time-specific fixed effects, which correspond to each survey year (2003, 2012, 2015, and 2018; with 2001 as omitted category), account for time-varying factors that are common across individuals and that may be correlated to both our outcomes and having a parent in need of LTC, such as macroeconomic conditions (e.g., recessions), changes of government, and gender stereotypes (that may be slowly changing over time).

The β's are parameters to be estimated, and u is an error term with the usual distributional assumptions. For variables with a significant percentage of missing values (more than 5%), i.e. being married or living with a partner, number of siblings, economic status, and health status, we replace the missing values with a zero and add a dummy variable indicating that the value is missing (as, for example, in Almond et al., 2010).

When the dependent variable is the dummy for working, β_1 estimates the change in the probability of working (in percentage points) associated with having one parent in need of LTC. When the dependent variable is the natural logarithm of the number of hours worked per week, β_1 provides an approximation of the percentage change in the number of hours worked, conditional on remaining employed. This approximation is accurate for values of β_1 close to zero, but worsens as the values get farther from zero. The literature usually refers to the scale of the betas as "log-points." The exact percentage change can be obtained from β_1 by using the formula $\exp(\beta_1)$-1.

We use a linear model also in the case of a dichotomous dependent variable because it produces consistent estimates (under the usual assumptions) and allows accounting for individual and time fixed effects. In contrast, non-linear models like probit or logit with fixed effects are known to be biased because of the incidental parameter problem, especially when the number of time periods is small as in our application (see, e.g., Lancaster, 2000; Greene, 2004).

In addition to the fixed-effect model, we also estimate OLS with and without controls. OLS estimates without controls are presented for reference, in the same spirit as the descriptive statistic results in Table 1. They show, for the pooled data (2001 to 2018), the unadjusted average difference in employment and the natural logarithm of hours worked (conditional on employment) between individuals with a parent in need of LTC and others with no parent in need of LTC. Intuitively, they give the unadjusted difference in the average outcome between the observations in the "treated" and "control" groups. OLS estimates with controls are also presented for reference, to show how the estimate of the treatment effect changes across models. Fixed-effect estimates are the focus of the analysis, and aim to estimate the causal effect of having a parent in need of LTC on labor supply, while controlling for time-variant observed and unobserved confounders that vary across individuals (by using individual fixed effects), and those confounders that vary over time but are common across individuals (by using time fixed effects).

5. CAUSAL EFFECTS OF LTC NEEDS ON LABOR SUPPLY IN MEXICO

Table 2 reports the results of the estimation of equation (1) for both the probability of employment (Panel A) and the logarithm of the number of hours worked, conditional on working (Panel B), for both women and men. Table 2 also shows results from the OLS models with and without controls.

We first consider the OLS model without controls, which provides an estimate of the observed difference in average outcomes between individuals who have a parent in need of LTC and those who do not (the estimated coefficient for "Father or mother requires LTC"), as well as the average outcome for the individuals who do not have a parent in need of LTC (the estimated constant term). Panel A shows that the employment rate of women who have a parent in need of LTC, while lower, is not statistically different from that of women who do not have parent in need of LTC. In contrast, the employment rate of men who have a parent in need of LTC is 1.82 percentage points higher (significant at the 10% level) than that of men who do not. When considering hours worked (conditional on employment), women with a parent in need of LTC work –5.98 log points, or –5.8%, less than those without such parent (significant at the 5% level), while the estimated difference is not statistically different from zero for men (0.00139). These observed differences, however, may not be interpreted as reflecting causal effects because there may be variables that simultaneously affect both having a parent in need of LTC and employment/hours worked

PANEL A – EMPLOYMENT						
	WOMEN			MEN		
	OLS	OLS	FE	OLS	OLS	FE
Father or mother requires LTC	–0.0127	–0.0175*	–0.0242**	0.0182*	0.0110	0.00444
	(0.00976)	(0.00950)	(0.0123)	(0.00942)	(0.00932)	(0.0135)
Age 50–54		0.149***	0.0346		0.194***	0.0784***
		(0.00831)	(0.0217)		(0.00875)	(0.0236)
Age 55–59		0.0833***	0.0359***		0.137***	0.0767***
		(0.00813)	(0.0132)		(0.00879)	(0.0145)
Married or living with partner (a)		–0.202***	–0.0754***		0.0310***	0.0284
		(0.00774)	(0.0207)		(0.0104)	(0.0270)
Number of siblings (a)		0.00107	0.00407		0.000949	–0.00229
		(0.00115)	(0.00274)		(0.00110)	(0.00279)
Excellent to regular health status (a)		0.0534***	0.0268**		0.206***	0.0595***
		(0.00980)	(0.0134)		(0.0148)	(0.0169)
Regular or poor economic status (a)		–0.00489	–0.0231**		–0.0500***	–0.0436***
		(0.00847)	(0.0108)		(0.00777)	(0.0120)
Did not complete primary schooling		0.00601			–0.00641	
		(0.0101)			(0.0117)	
Completed primary schooling		0.0209*			–0.0326***	
		(0.0108)			(0.0122)	
Completed secondary schooling		0.112***			–0.0592***	
		(0.0111)			(0.0122)	
Completed tertiary schooling		0.188***			–0.0525***	
		(0.0153)			(0.0134)	
Year = 2003		0.0159*	–0.00493		0.0213**	–0.0158
		(0.00961)	(0.00903)		(0.00936)	(0.00964)
Year = 2012		0.0306***	–0.0804***		–0.0293***	–0.287***
		(0.0110)	(0.0302)		(0.0107)	(0.0376)
Year = 2015		0.0704***	–0.0640*		0.00148	–0.284***
		(0.0105)	(0.0328)		(0.0108)	(0.0405)
Year = 2018		0.0717***	–0.105***		0.00536	–0.322***
		(0.0103)	(0.0386)		(0.00949)	(0.0461)
Constant	0.342***	0.266***	0.391***	0.803***	0.536***	0.875***
	(0.00365)	(0.0170)	(0.0408)	(0.00351)	(0.0216)	(0.0481)
Observations	19,605	19,163	19,163	14,780	14,336	14,336
R-squared	0.000	0.083	0.010	0.000	0.066	0.041
Number of individuals			10,523			8,140

(Contd.)

PANEL B – HOURS WORKED (NATURAL LOGARITHM), CONDITIONAL ON EMPLOYMENT						
	WOMEN			MEN		
	OLS	OLS	FE	OLS	OLS	FE
Father or mother requires LTC	−0.0598**	−0.0667***	−0.0703**	0.00139	0.000441	−0.0220
	(0.0248)	(0.0250)	(0.0335)	(0.0113)	(0.0114)	(0.0156)
Age 50–54		0.111***	0.00185		0.0908***	0.0170
		(0.0223)	(0.0589)		(0.0103)	(0.0278)
Age 55–59		0.0872***	0.0326		0.0548***	0.0407**
		(0.0229)	(0.0373)		(0.0104)	(0.0176)
Married or living with partner (a)		−0.0575***	0.0127		0.0620***	−0.0121
		(0.0161)	(0.0550)		(0.0130)	(0.0329)
Number of siblings (a)		0.00246	0.000182		0.00350***	−0.00155
		(0.00275)	(0.00742)		(0.00133)	(0.00330)
Excellent to regular health status (a)		0.00785	0.00163		0.0673***	0.0206
		(0.0303)	(0.0395)		(0.0198)	(0.0229)
Regular or poor economic status (a)		−0.0226	−0.00463		−0.0203**	−0.00658
		(0.0184)	(0.0280)		(0.00910)	(0.0140)
Did not complete primary schooling		0.00724			0.00625	
		(0.0308)			(0.0139)	
Completed primary schooling		0.0667**			0.0487***	
		(0.0316)			(0.0141)	
Completed secondary schooling		0.101***			0.0547***	
		(0.0294)			(0.0142)	
Completed tertiary schooling		0.101***			−0.0104	
		(0.0320)			(0.0152)	
Year = 2003		−0.225***	−0.184***		−0.116***	−0.121***
		(0.0241)	(0.0253)		(0.0108)	(0.0114)
Year = 2012		−0.201***	−0.286***		−0.0967***	−0.191***
		(0.0243)	(0.0896)		(0.0119)	(0.0476)
Year = 2015		−0.261***	−0.342***		−0.114***	−0.226***
		(0.0238)	(0.0969)		(0.0126)	(0.0505)
Year = 2018		−0.199***	−0.323***		−0.0673***	−0.224***
		(0.0226)	(0.112)		(0.0105)	(0.0566)
Constant	3.532***	3.600***	3.744***	3.845***	3.707***	3.961***
	(0.00828)	(0.0442)	(0.117)	(0.00402)	(0.0270)	(0.0593)
Observations	6,636	6,499	6,499	11,805	11,458	11,458
R-squared	0.001	0.034	0.048	0.000	0.036	0.048
Number of Individuals			4,493			7,053

Table 2 Effect of having a parent in need of LTC on Labor Supply in Mexico, Women and Men Ages 50–64.
Source: Authors' calculations based on 2001–2018 MHAS data. Note: Standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.10. (a): variables for which missing values were replaced with "0", and a dummy variable for missing value was included in the estimation.

(e.g., education level, health and economic status, etc.), thus confounding our relation of interest.

Table 2 also presents results from the OLS models with controls, which aim at controlling for some of those observed confounders. Note that this OLS model also includes time fixed effects, and thus adjusts for time-varying confounders that are common across individuals (e.g., macroeconomic conditions, administration changes, gender stereotypes, etc.). After adjusting for the observed variables in Table 2, we find that, for women, the estimated coefficient for having a parent in need of LTC is negative and statistically significant for both employment and hours worked (at the 10% level for employment), while they are not statistically different from zero for men. For employment, the results indicate that, for women, having a parent in need of LTC is associated with a decrease in the probability of employment by 1.75 percentage points, and with a decrease in the number of hours worked of 6.67 log points (or 6.5%). While these OLS results adjust for some potentially relevant confounders, there may be other potential unobserved confounders that may bias our relation of interest, such as the individual's personality, industriousness, innate ability, family background and genetic predisposition to certain diseases, as well as the parents' education level, innate ability, and genetic predisposition to certain diseases. For this reason, our preferred model is the fixed-effects model in equation (1), as it further adjusts for time-invariant confounders—like those previously mentioned—by including individual fixed effects.

The results from our two-way fixed effects model indicate that having a parent in need of LTC reduces women's probability of employment by 2.42 percentage points. This corresponds to a fall by 7.1%, relative to the average employment rate of women with no parent in need of LTC (34.2%; the estimated constant term in the OLS without controls in Table 2). In addition, for women who remain employed, having a parent in need of LTC reduces the number of hours worked in the primary occupation by 7.03 log-points, or 7.3%. This is equivalent to a reduction of 2.9 hours of paid work per week, relative to the average of 39.99 hours of work per week for women with no parents in need of LTC (the estimated constant term in the OLS without controls, with number of hours of work per week (not in logarithm) as dependent variable; not shown in the tables). In contrast to the results for women, the estimated effects of having a parent in need of LTC on employment and hours worked for men are both not statistically different from zero, with the estimated effect for employment being positive (0.00444) and for hours worked being substantially smaller in magnitude than the one for women (–0.022 vs –0.0703).

Overall, one key finding of our analysis is the lack of effect of having a parent in need of LTC on men's labor supply, while such effects are negative, statistically significant, and economically non-negligible for women. For men, the estimated effects are in general small in magnitude and not significantly different from zero across the board: men ages 50–64 do not significantly alter their employment or work intensity in response to their parents' care dependence. In contrast, for women, the effect of having a parent in need of LTC on labor supply is not only statistically significant, but also of non-negligible magnitude: a decrease of about 7% in both employment and hours worked relative to women with no parent in need of LTC.

Interestingly, note that despite adding further controls when moving from the OLS without controls to our preferred fixed-effects model, the estimates of β_1 (our parameter of interest) are relatively stable in magnitude and in statistical significance across models. For example, for women, the estimated effect of having a parent in need of LTC on employment ranges from –1.27 percentage points in the OLS without controls to –2.42 in the fixed effects model, and from –5.98 to –7.03 log-points for hours worked. Moreover, when considering the three models for a given outcome and gender, the estimates of β_1 are not statistically different from each other (e.g., their confidence intervals overlap). This is congruent with the treatment variable "having a parent in need of LTC" being relatively exogenous, and the estimated effects being causal. Consider the fact that our estimated effect remains relatively stable as we control for a much wider array of possible observed and unobserved confounders when moving from the OLS without controls to the two-way fixed-effects model. Intuitively, this gives us confidence that if there existed an unobserved confounder that *simultaneously* varied across individuals *and* over time (which our fixed-effects model does not directly control for), adding it to our model would not drastically change our estimated effect.[8] While we cannot be certain that this is indeed the case, the consistency of our estimated effects across the models considered, along with the wide array of observed and unobserved confounders our two-way fixed effects model controls for, suggests that it is plausible that our estimates are causal.

Finally, for completeness, we briefly discuss other estimated coefficients from our fixed-effects models. When controlling for individual and time fixed effects, few more variables significantly affect women's employment. This is significantly lower for women that are married or live with a partner (by 7.5 percentage points [p.p.]) or have a low or regular economic status (by 2.3 p.p.); and higher for women with a regular or excellent health status (by 2.7 p.p.) or that are younger than 60. In contrast, no control variable simultaneously varying over time and across individuals significantly affects the number of hours worked, conditional on remaining employed. Some of those variables also affect men's employment, e.g. age and having low or regular economic status decrease

employment (by 7.7 p.p. for men younger than 60, and by 4.4 p.p. for those with low or regular economic status), while having regular or excellent health increases it (by 6.0 p.p.). For men, however, being married or living with a partner does not seem to affect employment.

5.1. RELATION WITH THE LITERATURE THAT ESTIMATES THE EFFECT OF PROVIDING LTC ON LABOR SUPPLY USING "HAVING A PARENT IN NEED OF LTC" AS AN INSTRUMENT

As discussed in Section 2, previous literature has focused on estimating the effect of providing LTC on labor supply, instead of the effect of having a parent in need of LTC, as we do in this paper. Some papers have used having a parent in need of LTC (or measures of parental health) as an instrumental variable (e.g., Heitmueller, 2007). In this subsection, we relate the methodology we use to that of those papers and explain where our work fits in their context.

Instrumental variable (IV) methods are based on the availability of a so-called instrumental variable ("having a parent in need of LTC"), which is used to estimate the effect of a given treatment ("providing LTC") on an outcome (labor supply). The main assumption of IV methods is the exclusion restriction, which requires the instrument to affect the outcome *only* through the treatment; in other words, it rules out direct effects of the instrument on the outcome (e.g., Angrist & Pischke, 2009:p.155). In the present context, it requires that having a parent in need of LTC affects labor supply *only* through its effect on providing LTC, i.e., that providing LTC is the *only* channel how having a parent in need of LTC can affect labor supply. Therefore, this assumption rules out the existence of other channels through which having a parent in need of LTC can affect the individual's labor supply, some of which were discussed in Section 2 (e.g., individuals increasing labor supply to pay for parents' LTC and/or medical expenses, or to help support their parents economically).[9]

Under the exclusion restriction assumption, the IV estimator of the effect of the treatment (providing LTC) on the outcome (labor supply) equals the effect of the instrument (having a parent in need of LTC) on the outcome (labor supply) divided by the effect of the instrument (having a parent in need of LTC) on the treatment (providing LTC). In the econometrics literature, the effect of the instrument on the outcome is usually referred to as the "reduced-form effect," and the effect of the instrument on the treatment as the "first-stage effect" (see, e.g., Angrist & Pischke, 2009:p.120). In this instrumental variable context, our fixed-effects model in equation (1) can be thought of as estimating the reduced-form effect of the instrument (having a parent in need of LTC) on labor supply, which is given by β_1. In principle, if we had information on the provision of LTC, we could obtain an IV estimate of the effect of providing LTC on labor supply by dividing β_1 by the effect of having a parent in need of LTC on provision of LTC (the first-stage effect). Unfortunately, our data does not contain information on the current provision of LTC.

To get a sense of the possible magnitude of the effect of providing LTC on labor supply employing the results from Table 2 as our "reduced-form effects," we employ a secondary data set to get a back-of-the-envelope estimate of the effect of "having a parent in need of LTC" on "providing LTC" (the first-stage effect). Constructing IV estimates from reduced-form and first-stage estimates coming from different data sets is not uncommon in the literature (e.g., Angrist, 1990). Data from the 2014 Mexican time-use survey show that 6.85% of women ages 50 to 64 provide LTC. This is likely to be an upper-bound estimate of the figure that we would apply to MHAS data used in model (1), as LTC in the time-use survey is not restricted to women's parents. In Table 1, we saw that 14.1% of women in our sample have a parent in need of LTC. This suggests that no more than 49% of women with parents in need of LTC actually provide it (0.0685/.1410 = 0.4858). Taking this number as our back-of-the-envelope estimate of the first-stage effect of having a parent in need of LTC on providing LTC, the IV estimates of the effect of "providing LTC" on women's labor supply would therefore be equal to $\beta_1/0.4858$, i.e., about twice as large as our estimates of β_1. For example, under the exclusion restriction assumption and using our previous finding that for women the effect of having a parent in need of LTC on both employment and hours worked was a decrease of about 7%, the back-of-the-envelope calculations above suggest that for women the effect of *providing LTC* on both employment and hours worked is a decrease of about 15%.[10]

6. CONCLUSIONS AND POLICY IMPLICATIONS

In a context of lack of public services and insufficient or unaffordable market supply, the responsibility of supporting care dependent individuals in Mexico, and in Latin America and the Caribbean more generally, is traditionally borne by families. Worldwide, and Mexico is no exception, most of this responsibility falls on women. This hinders the promotion of women's employment, with likely consequences on women's economic autonomy, gender equality and the distribution of power within the household.

These issues have been analyzed in high-income countries that are further along in the demographic transition, while evidence from emerging regions is still mostly anecdotal or descriptive. In this study, we provide the first evidence of the causal effect of parental LTC needs on employment and the number of hours worked

in a Latin American country. Exploiting the longitudinal nature of the Mexican Health and Aging Study, we show that having a parent in need of LTC significantly reduces labor supply for women ages 50–64 on both the extensive and intensive margins. In contrast, there is no effect of parents' LTC needs on male employment and work intensity.

The magnitude of our results is within the range of those in the existing literature. Most of the literature, however, has focused on the effect of providing LTC instead of the effect of having a parent in need of LTC. Among studies that use fixed-effect models, Crespo and Mira (2014) find the largest impact of the provision of LTC on employment: a 45–65% reduction in the probability of being employed for women providing daily caregiving in Southern Europe (using fixed-effects combined with instrumental variables). The largest effect on hours of paid work is found by Van Houtven, Coe and Skira (2013): a reduction by three hours of work per week for individuals providing intensive caregiving in the United States. Leigh (2010) estimates that caregiving reduces labor market participation by five percentage points, and weekly hours worked by 1.2. Although we focus on the effect of having a parent in need of LTC (rather than LTC provision), our result for the employment rate is intermediate in terms of magnitude relative to the existing literature, with an estimated reduction by 7.1%. In contrast, our estimation of the effect on the number of hours worked, at −7.3%, is on the high side of the range. Importantly, in line with most existing literature, we find that LTC only affects women's labor supply.

Beyond the immediate effects on income, the negative impact of parents' LTC needs on female employment and number of hours worked is likely to have long-term consequences through slower career progression and wage growth. It is likely to make caregivers less prepared to fund their own retirement, hence more dependent on family and government support. The fact that this is only observed for women, while men continue their professional life, irrespective of parents' LTC needs, has important gender equality implications.

These challenges will increase in the next few decades, due to rapid population aging and the consequent forecasted growth in the demand for LTC. Aging will increase the demand for eldercare, while families are becoming smaller, have fewer children, and are more geographically dispersed. The burden of LTC may constrain the future growth of female labor supply, in a region where female employment rates have been historically low, with negative effects on economic growth (ECLAC/ILO, 2019).

All of these considerations point to the need for reforms to rebalance the burden of care within families and reduce its impacts on women's employment. The policy options include the creation of LTC systems, financed for example through social insurance schemes or general taxation. This option would professionalize the supply of LTC, with the potential to create high-quality formal jobs for both women and men, as observed in other regions in the world.[11]

The creation of LTC systems, however, will not entirely replace the provision of care by family members. To promote a more equal distribution of the remaining tasks across genders, as well as to ensure an equitable participation of men in the LTC profession, social norms need to change. In this regard, social and education policies could strengthen initiatives focused on reshaping the traditional cultural norms around the provision of care. Finally, the creation of LTC systems could be complemented by the introduction of telework and part-time work policies for family members (irrespective of their gender) of care-dependent older persons (Addati, Cattaneo & Pozzan, 2022).

NOTES

1 In Spanish, *Estudio Nacional de Salud y Envejecimiento* (ENASEM): http://www.enasem.org/Index_Esp.aspx.

2 In the presence of heterogeneous treatment effects (e.g., when the effect of providing LTC on labor market outcomes vary across individuals), OLS and IV models estimate effects for different groups. Specifically, while OLS estimates the average effect in the population, IV models estimate the average effect of providing LTC only for those individuals who are affected by the instrument (e.g., parental health), usually called the Local Average treatment Effect (LATE) (Angrist and Pischke, 2009:p.155). Therefore, assuming the IV assumptions hold, differences between OLS and IV estimates may come from possible bias in OLS estimates *or* from the fact that OLS and IV models estimate effects for different populations.

3 For more information on the sampling framework and the contents of the questionnaire of the MHAS, see: http://www.mhasweb.org/StudyDescription.aspx.

4 The question has the same phrasing in all waves of the MHAS except 2001, when the person was asked "During the past week, you? (1) worked; (2) had a job but did not work; (3) looked for work; (4) were a student; (5) did home unpaid work; (6) did not work". In this case, the person was classified as "employed" if she answered (1) or (2).

5 The question is the same in all waves of the MHAS except in 2001, when the person was asked how many hours she worked during a normal day. The answer to this question was multiplied by six (average number of days worked in MHAS data for people aged 50–64) to obtain the number of hours worked per week. Results are robust to different assumptions on the number of days worked per week.

6 For completeness, we also estimated random-effects versions of the fixed-effects models presented below. The random-effect estimates are generally consistent in size and significance with our fixed-effect estimates, and are available from the authors upon request.

7 The parent may live with the child, in a separate home, or in an institution. The MHAS also contains information on in-laws in need of LTC. If this is included in the treatment variable (having a parent or in-law in need of LTC), results are not significant. This suggests that employment is affected by the need of LTC of one's own parents, not those of their partner.

8 Note that our two-way fixed effect model does implicitly control to some extent for unobserved confounders that simultaneously vary across individuals and over time. As an example, consider the potential confounder "economic status of parents". While our fixed-effects model does not directly control for this variable, the inclusion of individual fixed effects controls to some extent for it by controlling for time-invariant (from 2001 to 2018) characteristics of the parents, such as their education

level and innate ability, which the literature shows are highly correlated with economic status.

9 While this assumption seems unlikely to hold, because individuals may change their labor supply in response to having a parent in need of LTC even if they are not the ones providing LTC (which would violate the exclusion restriction), it has been previously used in the literature.

10 If, as previously mentioned, we think of the estimates 0.0685 and thus 0.4858 as upper bounds for their respective parameters, then the estimate of the effect of providing LTC on labor supply given by $\beta_1/0.4858$ would represent a lower bound on this effect.

11 This is part of the silver economy. See Okumura et al. (2020).

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The authors have no competing interests to declare.

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