

# WORKING AND CARING: THE SIMULTANEOUS DECISION OF LABOR FORCE PARTICIPATION AND INFORMAL ELDERLY AND CHILD SUPPORT ACTIVITIES IN MEXICO\*

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We analyze factors determining women's decisions to participate in the labor market and provide elderly care and nonfinancial support to their (grand)children. We use data from the Mexican Health and Aging Study, a survey of people aged 50 and over, applying a three-equation, reduced-form SUR model. Results suggest that care needs are the driving force behind caregiving activities. Traditional roles also appear to be relevant in the labor force participation decision: women with a closer labor market connection when they were young are more likely to work. Simulations of demographic changes illustrate potential effects for future caregiving and participation rates.

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## 1. INTRODUCTION

Labor force participation and caregiving activities are competing for the scarce time of many people. In some age categories, two different kinds of caregiving activities are required simultaneously: care provided to aging parents who begin to suffer from functional limitations and care for the individual's own children (Rubin and White-Means, 2009). Although these are activities of a very different nature, both require time that cannot be spent in other ways, in particular on paid labor. Given that, like many OECD countries, Mexico and other Latin American

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countries are experiencing the aging of their population (Burniaux *et al.*, 2004; Zúñiga Herrera, 2004; CISS, 2005), it is important to understand how caregiving activities and labor force participation interrelate and whether expansion of services or support may be needed in the future.

In Mexico, public provision of child care facilities is limited while subsidized long-term or elderly care services are almost non-existent; at the same time, privately paid services are too expensive to be a viable alternative for large sections of the population. There is a private market for home care services, especially for domestic services, but for more specialized (nursing) tasks and residential care the market is small and costs are unaffordable for the large majority of the population, while publicly provided services are virtually absent. In principle, child care services are available through the social security system (for formally employed people) and through the *Programa de Estancias Infantiles* (child care programs for those in informal jobs without access to social security, which is about half of the labor force). However, the access criteria and the number of child care slots imply that actual availability is limited (CONEVAL, 2011).

Care provided informally within the family is therefore an important source of nonfinancial support or help for both the elderly and (grand)children. Mexico is not unique in this sense; a similar situation exists in many other Latin American countries as well as southern Europe (CISS, 2008; Pommer *et al.*, 2007). A tradition of extended families in which several generations live together and share responsibility for household chores further stimulates and facilitates that both care for the elderly and care for children and/or grandchildren are arranged within the household. For the generation in the middle, sometimes called the sandwich generation (Miller, 1981), regardless of whether they reside in the same household as the older and younger generations, strong intra-familial pressure to provide care may affect their opportunities to participate in the labor market and contribute an additional source of income to the household.

In this paper we analyze the factors that determine the decision to participate in the labor market, to provide care for the elderly, and to provide nonfinancial support to (grand)children (that is, spend time helping them with a variety of activities). We use data from the Mexican Health and Aging Study (MHAS), a survey applied in 2001 to people aged 50 and older, including their (younger) partners. This survey contains information on the respondents' living situation, as well as information about their children and their parents. Specifically, the respondents answer questions about the financial and nonfinancial

care they provide to their (grand)children and to their parents. We estimate a three-equation, reduced form, seemingly unrelated regression (SUR) model of the three decisions in question.

The results suggest that the need for care is the main force that determines the caregiving activities of women aged 45 to 69, more so than the household's economic situation. Traditional roles also appear to be a relevant issue in the labor force participation decision, as women who had a close connection with the labor market in their younger years are more likely to work, while other income in the household reduces participation. With simulations of conceivable demographic changes in Mexico, such as an aging population due to increased life expectancy and reduced fertility rates, we illustrate potential effects for future caregiving and labor participation rates. A predictable increase in the need for long-term care due to the presence of more elderly parents can be compensated if health improvements are achieved, while an immediate decline in caregiving needs results from a reduction in the number of young children. The simulations suggest that the labor force participation rate is not very sensitive to these demographic changes and does not grow considerably even when the need for caregiving activities decreases.

The next section discusses the literature on informal caregiving activities in relation to labor force participation decisions. Section 3 presents the empirical framework for jointly analyzing the three decisions and introduces the data used. Section 4 presents the estimation results, while Section 5 provides some simulation results that highlight the potential consequences of prospective demographic changes. Section 6 concludes the paper.

## 2. LITERATURE

In the economics literature, theoretical models of the supply of informal elderly care in combination with the labor force participation decisions of potential caregivers are widely available, as well as models that describe decisions regarding labor force participation and child care usage. However, models that jointly analyze the three decisions are scarce.

Basically, models of supply of informal elderly care describe a trade-off between work, leisure, and informal care, typically from the perspective of the caregiver (Nocera and Zweifel, 1996; Nizalova, 2012; Fevang *et*

*al.*, 2008). Taking into account that informal care is usually unpaid, the caregiver must directly derive utility from the activity in order to be willing to provide care to his or her parents. Several motives can be distinguished, including altruism, sense of duty, social norms, reciprocity, bequest, and setting an example for children, but in general the model boils down to some mechanism where the caregiver derives utility from the care given to the care recipient. Often, elderly or long-term care (LTC) bought in the market is considered a component of general consumption; neither privately purchased LTC nor publicly provided or subsidized LTC are modeled explicitly, something that fits well with the Mexican situation.

The empirical LTC literature commonly estimates a reduced-form specification that implies that LTC and labor force participation are explained only by exogenous variables, without a direct interaction between employment and LTC. It avoids the discussion regarding the order of decisions to participate in the labor market and provide care; in general it is not clear a priori which decision comes first or what is the causal relation between the two decisions. Chang and White-Means (1995) estimate a two-decision model where the first one is the decision to work and the second is how many hours to work; however, their sample only contains caregivers and ignores the trade-off between labor and care decisions. Several studies investigate the effect of caregiving on labor force participation: some report negative effects (e.g., Ettner, 1996; Bolin *et al.*, 2008) while others do not find an effect (e.g., Wolf and Soldo, 1994; Meng, 2013). Differences are generated, among other factors, by differences in the amount of care that is provided (Carmichael and Charles, 1998, 2003). Heitmueller (2007) emphasizes that accounting for the endogeneity of LTC in the explanation of labor force participation is essential. Carmichael *et al.* (2010) provide evidence that employment and earnings generate opportunity costs and have a negative effect on the willingness to supply informal elderly care. Using cross-sections, Leigh (2010) finds a large negative effect of LTC on participation, but this effect almost completely disappears with panel data. He explains this difference as caused by incomplete control for individual heterogeneity in the cross-section models: “the kinds of people who provide care tend to have low levels of labor force attachment even before or after they have provided that care.”

The general framework for child care demand models is set by the work of Connelly (1992) and Ribar (1995). In these, and in many of the later models and applications (e.g., Michalopoulos and Robins,

2002; Blau and Currie, 2004; Tekin, 2007), the focus is on the labor force participation decision of mothers with young children and their demand for formal (paid or subsidized) child care services. Informal care, for example that provided by grandparents, is sometimes explicitly included as a specific class of care while the mother's own time spent with children is generally considered only implicitly. In contrast with the models for elderly care supply, in the perspective of most child care models it is the optimizing mother who determines her labor supply and demand for grandparental childcare; hence it is not the informal caregiver who takes the decisions, as is the case in elderly care models.

Empirical work on child care decisions often includes both the labor force participation for the complete sample and usage of external child care (by professionals or informal caregivers) conditional upon working. Although the child care decision is observed as being conditional upon being employed, the econometric models used generally take the simultaneity of the decisions into account. This construction is often enforced by the available data, in the sense that in many surveys information about child care decisions is only requested from working mothers. In this paper we model the supply of informal child care provided by women over 45 to their (grand)children, in contrast with the child care literature which generally focuses on demand or use of (formal or informal) child care services by mothers confronted with the decision to work or spend more time with their children.

To bring together the two categories of care and their respective streams in the literature, we need an approach that starts from the same perspective. The natural choice seems to be the perspective of the caregiver, as in the elderly care models, and a focus on the supply of informal care, both LTC provided to the elderly and child care provided to (grand)children. One of the few models that combines child care and elderly care and explains the allocation of parental time between the three activities—labor market, child care, and elderly care—can be found in Giménez-Nadal *et al.* (2007), with empirical applications in Giménez-Nadal *et al.* (2010, 2012). Essentially, they combine the two-generation models demonstrated above for elderly care and child care provision into a three-generation modeling framework where the middle generation maximizes its utility and decides how much care to provide to the older generation (elderly care) and the younger generation (child care). In the theoretical model they emphasize the role of setting an example for children (the “demonstration effect”; see also Cox and Stark (2005) for a similar analysis regarding monetary intergenerational

transfers) as a motive for LTC, a factor that is indeed shown in empirical implementations, although a substitution effect is also found: more young children in the household reduces the time spent on elderly care and work in the labor market (Giménez-Nadal *et al.*, 2010, 2012). Other motives such as altruism or prevailing social norms and values may be equally valid or more relevant than setting an example per se, especially in a society like Mexico, where family ties are stronger and extended families are more common than in (Northern) Europe and the United States (OECD, 2012). The basic theoretical framework for providing LTC and child care essentially boils down to the same set of equations as explained before, regardless of the motivation behind it.

### 3. EMPIRICAL STRATEGY

Modeling labor force participation conditional on care decision(s) or modeling care conditional upon work outside the home, which is not uncommon in the literature reviewed in the previous section, hides the inherent simultaneity of the decisions, failing to acknowledge that it is not a priori clear which decision comes first. Given that we observe labor force participation and caregiving activities for all sampled people and therefore are not hindered by non-observability of one or more decisions for a potentially endogenously selected fraction of the sample, in Section 3.1 we describe an empirical framework that simultaneously takes the three decisions into account, followed by a presentation of the data and the relevant variables in Section 3.2.

#### 3.1 Model set-up

We propose a reduced form, seemingly unrelated regression (SUR) model of three equations, describing the propensities of the middle generation (parents) to participate in the labor market, to provide informal care to the older generation (grandparents), and provide care for the younger generation ((grand)children):

$$\begin{aligned} T_l^* &= \gamma_l + X_j \beta_{jl} + \varepsilon_l, \\ T_e^* &= \gamma_e + X_j \beta_{je} + \varepsilon_e, \\ T_h^* &= \gamma_h + X_j \beta_{jh} + \varepsilon_h, \end{aligned}$$

where the dependent variables of the three equations are latent variables representing the propensities of work ( $T_l^*$ ), elderly care ( $T_e^*$ ), and care for (grand)children ( $T_h^*$ ). What are observed are the binary indicators of whether or not the respondent works ( $T_l$ ), provides care to her parents ( $T_e$ ), and provides care to her own children or grandchildren ( $T_h$ ), where, for  $i = l, e, h$ , each  $T_i = 1$  if  $T_i^* > 0$  while  $T_i = 0$  if  $T_i^* \leq 0$ . The three binary decisions yield a trivariate, seemingly unrelated (SUR) probit model. The individual and household characteristics that determine the hours spent on the different activities are encompassed by  $X_j$ . We consider a reduced-form model for the three simultaneous decisions, using right-hand side (explanatory) variables that enter into all three equations while the endogenous variables (in particular, the number of hours) do not appear on the right-hand side. By implication, we limit ourselves to the marginal effects of explanatory variables on the outcomes without accounting for the direct effects of labor force participation on caregiving activities, for example, or the effects in the opposite direction; it is not a priori clear which order would be correct and it is also difficult to test for this. In doing so we follow Giménez-Nadal *et al.* (2007, 2010) and jointly estimate the three equations while allowing for correlations between their error terms.

### 3.2 Data

The data used in this paper are from the Mexican Health and Aging Study, or MHAS (*Estudio Nacional sobre Salud y Envejecimiento en México, ENASEM*)<sup>1</sup>. The MHAS is organized as a panel survey, where the baseline survey (held in 2001) is constructed as a nationally representative sample of about 13 million Mexicans aged 50 and over. The survey contains questions about sociodemographic status (including information on children living outside the household), health status, functional limitations, use of health services and other sources of support, current and previous labor status, sources of income, and assets. Both the heads of the selected households as well as their partners were interviewed, independent of their age, resulting in a total sample size (in 2001) of 15,186 individuals from 9,862 households.

In the analysis we focus on the approximately 6,000 women between 45 and 69 years old in the sample, because this is the age at which

1. The data can be accessed at <http://www.mhasweb.org/>; see Puig *et al.* (2006) and Wong *et al.* (2007) for more information.

it is more likely that the respondent's parents or in-laws are still alive while the (grand)children may still be young enough to require supervision, and where labor force participation is still an issue.<sup>2</sup> Women are usually the most involved in caregiving activities. Unlike Fevang *et al.* (2012), we include respondents whose parents live in the same household and use dummy variables to capture the possible direct effect of this cohabitation condition on caregiving and labor decisions.

Note that we do not use a sample of only those people who still have at least one parent alive or have children or grandchildren. By presenting unconditional estimations we make it possible to perform simulations that consider the higher survival rates of elderly parents and the lower fertility rates of younger generations. Estimations with samples conditional upon having living parents suggest that our construction adequately captures the relevant effects of other variables; only minor changes are encountered.

### *Dependent variables*

Information on labor status is derived from questions regarding business ownership and salaried jobs. Those who respond positively to the question, "During the last year, did you have a principal [secondary] job?" are considered participants in the labor force, and in addition we consider the respondent a participant if they provide an affirmative answer to the question, "Do you (and/or spouse) own a business or farm?" and if he or she is identified as the (co-)owner through the follow-up question "Who owns this business?" Combining salaried workers and business/farm activities results in a (annualized) labor market participation rate of 45.2% of the women aged 45-69.<sup>3</sup>

Information regarding elderly care activities is derived from the survey question, "In the last 2 years, did you (or your spouse) help your parents with basic personal activities such as dressing, eating or bathing because

2. The survey sample includes people aged 50 and over, but partners of the sampled respondents were also interviewed. Given that many men had younger wives, we have a large number of women aged 45-49 who we decided to include in our analysis, even though they may not be fully representative of the entire population in this age group. Performing the analysis without them results in only minor differences.

3. In an earlier version we used a survey question on labor activities that referred to the week prior to the interview, where "Worked" and "Did not work but had a job" were considered participation. Using that measure, only 27.3% of the women worked; this number compares well to other sources (Juarez, 2010; Murrugarra, 2011). We prefer the definition used in the current version because the time periods for the care indicators and labor are more comparable; the data do not provide information regarding care activities in shorter periods.

of a health problem? Exclude help with household chores, errands, and transportation”, and specifically from responses to the subsequent question, “Was this help for at least 1 hour a week, or about 100 hours in the last 2 years?” asked only if the respondent gave a positive reply to the previous question. Both questions are asked only if at least one of the respondent’s parents is alive. The formulation of the question does not allow for precise identification of the caregiver. Given that the questions are asked of both the sampled respondent as well as their spouse, we decided to combine the information into a variable that indicates that care is given to either the respondent’s parent(s) and/or to the parent(s)-in-law. Furthermore, we assume that if care is given, the female spouse is involved in that care. Research in a variety of countries shows that women carry more of the responsibilities of informal long-term care (Hammer and Neal, 2008; Spillman and Pezzin, 2000; Lilly *et al.*, 2007, Giménez-Nadal *et al.*, 2010), suggesting that our assumption is not very restrictive.

Information on nonfinancial support provided to children and grandchildren is obtained through the survey question “In the last two years, have you (or your spouse) spent at least one hour a week helping your children/their spouses/your grandchildren (or those of your spouse)?” An affirmative response results in a positive value for our indicator for child support activities by the respondent. In contrast with the literature that generally focuses purely on child care provided to young children (aged 0-4 or 0-12), the MHAS survey asks for time spent helping (grand) children without specifying the activities. Hence, it may refer both to general household chores as well as to child care itself.

Table 1 shows the number of observations available for the analysis and the number of working and caregiving women in our sample. Provision of support activities for children or grandchildren is much more common than elderly care—47.9% and 7.8%, respectively—which is not surprising given that the number of children and grandchildren of each respondent is potentially large while there is a natural limit on the number of (living) parents. Among working women caregiving for the elderly is slightly more likely than among nonworking women (8.6 vs. 7.0%) but slightly lower when we look at child support activities (47.2 vs. 48.6%). As a first impression, the respondent’s support for children seems to be in conflict with labor force participation, while work and elderly care do not seem to affect each other. Of those who provide support to the elderly, 56.2% also provide support to children. Obviously, the same “care combiners” as a fraction of the child supporters is much lower, 9.1%. Child support activities among those who do not care for the elderly, as well as elderly

**Table 1. Dependent variables: employment, LTC, and child care (Percent)**

Care for parents	Working and non-financial assistance for children								
	Not working			Working			Total		
	No	Yes	Total	No	Yes	Total	No	Yes	Total
No			93.0			91.4			92.2
Row-%	52.0	48.0	100	53.8	46.2	100	52.8	47.2	100
Column-%	93.9	92.0		92.9	89.6		93.5	90.9	
Yes			7.0			8.6			7.8
Row-%	44.4	55.6	100	43.2	56.8	100	43.8	56.2	100
Column-%	6.1	8.0		7.1	10.4		6.5	9.1	
Total	51.4	48.6	100	52.8	47.2	100	52.1	47.9	100
Observations			3,308			2,729			6,037
			54.8			45.2			100

Source: Authors' calculations based on the MHAS 2001 survey.

care among those who do not provide nonfinancial support to children is slightly lower—47.2% and 6.5% respectively—indicating that caregiving activities may complement each other.

### *Explanatory variables*

As explanatory variables for the three decisions, we include a set of variables that describe the health and living situation of the respondents' parents, another set that accounts for the presence of children and grandchildren, a block that represents the respondent's labor history, as well as demographic and socioeconomic characteristics. All variables are included in all three equations, as is common in a reduced-form framework, although obviously we should expect that the information regarding parents and (grand)children has the greatest effect on support provided to the elderly and children, respectively; cross-effects are captured through inclusion of the determinants in all equations and through the correlations between them.

With regard to the elder generation, we include information on the parents and in-laws. Both the respondent and the spouse are asked whether the father and the mother are still alive, and if so, whether they are in need of help (using the survey question "Due to a health problem,

does your mother [father] need any help with basic personal needs like dressing, eating or bathing?") and whether they can be left alone (based on the survey question "Can your mother [father] be left alone for an hour or more?"; this is recoded such that our variable indicates a more severe problem, i.e., that the parent cannot be left alone). The information is combined into variables that count the number of parents and in-laws that match the respective conditions. The respondents have on average 0.79 living parents or in-laws (Table 2; not shown is that 50% of the respondents have at least one living parent or in-law). The majority of them are in such good health that no help is needed; the average respondent has 0.179 parents/in-laws in need of care, while on average they have 0.099 parents/in-laws who cannot be left alone. For 84.4% of all respondents there are no parents/in-laws who need help, and 91.3% of the respondents have no parents/in-laws who cannot be left alone. Furthermore, we include counts of the number of parents/in-laws living with the respondent (on average, 0.039) and the number of parents/in-laws living alone or with their spouse (on average, 0.294); the reference category is formed by parents living with other children or relatives for at least part of the year.<sup>4</sup>

**Table 2. Explanatory variables**

	Mean	Std.dev.	Min.	Max.
<b>Parents</b>				
#parents/inlaws alive	0.787	0.963	0	4
#parents/inlaws who need help	0.179	0.445	0	4
#parents/inlaws cannot be alone	0.099	0.335	0	3
#par./inlaws living with respondent	0.039	0.210	0	2
#par./inlaws living alone/spouse	0.294	0.676	0	4
<b>(grand)children</b>				
#nonresident grandchildren	7.899	8.640	0	67
nonresident grandchildren under 18	0.760	0.427	0	1
#(great)grandchild in hh	0.619	1.196	0	13
#hh-members aged 0-4 years	0.225	0.554	0	5
#hh-members aged 5-11 years	0.330	0.719	0	8
#hh-members aged 12-17 years	0.396	0.721	0	5

4. Inclusion of information about the age and education level of elderly parents does not add much explanatory power.

Table 2. (continued)

	Mean	Std.dev.	Min.	Max.
<b>Sociodemographic background</b>				
married/living together	0.690	0.462	0	1
#siblings alive	5.100	2.958	0	21
age	56.521	6.335	45	69
educ.: none (ref.cat.)	0.221	0.415	0	1
educ.: primary	0.544	0.498	0	1
educ.: secondary	0.065	0.247	0	1
educ.: technical/commercial	0.095	0.293	0	1
educ.: preparatory or higher	0.075	0.263	0	1
speaks indigenous language	0.068	0.252	0	1
locality size: over 100000 inhab. (ref.cat.)	0.615	0.487	0	0
locality size: 15000-100000 inhab.	0.149	0.356	0	1
locality size: 2500-15000 inhab.	0.086	0.281	0	1
locality size: less than 2500 inhab.	0.150	0.357	0	1
<b>Socioeconomic background</b>				
non-business assets (*\$1mln)	0.330	0.584	-0.595	13.67426
hh nonlabor income (*\$1000)	3.775	97.660	-500	7500
spousal labor income (*\$1000)	2.421	34.065	-500	2292.222
access to medical services	0.641	0.480	0	1
made pension deposits, 1-10 years	0.045	0.208	0	1
made pension deposits, 10-25 years	0.056	0.231	0	1
made pension deposits, >25 years	0.049	0.216	0	1
<b>Health status</b>				
self-assessed health (0-4)	1.260	0.808	0	4
#problems with ADL (0-6)	0.177	0.700	0	6
#problems with IADL (0-4)	0.089	0.426	0	4
suffers a chronic disease	0.616	0.487	0	1
poor mental health status	0.127	0.333	0	1
Source: Authors' calculations based on the MHAS 2001 survey.				

Regarding the younger generations, we include the number of (great-) grandchildren who are living in the same household as the respondent, as well as specific indicators for the number of household members under age 5, between 5 and 11, and between 12 and 17. Because children or grandchildren who do not live in the same household as the respondent may live near enough to receive support and attention, we also include indicators of the number of grandchildren of the

respondent's nonresident children, as well as an indicator of whether some of them are less than 18 years old.<sup>5</sup> The respondents have, on average, 7.9 nonresident grandchildren, and 76% of the respondents have nonresident grandchildren aged under 18 (Table 2). The total number of household members aged 0 to 17 is much lower—less than 1—but given the proximity they could influence the decision-making process.

There may be some concern about the exogeneity of the explanatory variables, in particular with regard to the fertility decision reflected in the number of grandchildren—potential parents who know that grandparents will help may be more likely to become parents—and the parental living situation, as the decision to live in the same household may be driven by the elderly parent's or the household's care needs. We argue that fertility decisions are not strongly affected by the availability of grandparents; contraceptives and other birth control measures are less widespread than in many other Western countries, the average age at which mothers have their first child is lower, and the number of children per mother is higher (OECD, 2012). Regarding the living arrangements of the elderly, the proportion of elderly living in multigenerational households is much higher than in the U.S. and Europe (OECD, 2012); Aranibar (2001) reports that around 80% of the elderly live in multigenerational households. Traditions, preferences, and considerations of space and available resources of both the elderly as well as the respondent and her siblings are expected to be much more important than care needs alone; furthermore, there is a tendency not only for the elderly to move in with their adult children but also for adult children to continue living with their parents. Hence, although we acknowledge that endogeneity cannot be ruled out completely, we consider that care opportunities play a minor role in those decisions.

Information about pension fund contributions accounts for the connection with the labor market. On the one hand, past contributions imply a history of formal employment (since most pension contributions are provided through the social security system, which requires contributions based on formal employment), while on the other hand prolonged periods of contributions create the opportunity to retire from the labor market with a pension and spend more time on care activities. Table 2 shows that 4.5% of the respondents have fewer than 10 years of contributions; this is generally an insufficient amount of time to claim a pension. About 5.6%

5. The survey provides information on the number of grandchildren but not how many of them are younger than 18.

report between 10 and 25 years of contributions, which qualifies them for a partial pension. With more than 25 years of contributions (4.9% of the respondents), retirement with the maximum pension is possible. Thus, the majority of respondents do not report any pension contributions, indicating the absence of a labor history in the formal sector. Access to health care services provided by the social security system can also be obtained through the formal employment of the spouse or other family members. Table 2 shows that 64.1% report access to these health care services, which implies, given the much lower (formal) employment rates in our sample, that the majority obtains access through derived rights. Social security institutes also provide child care services; hence, although access rights and actual opportunities differ, the same variable tells us something about the availability of formal child care.

We include sociodemographic variables such as age (56.5 years on average), and whether the respondent is married or living in a consensual union (69%). The respondents have on average 5.1 living siblings. About 22.1% of the respondents have no or incomplete primary education, while 54.4% report (completed) primary education as their highest level. Secondary education (generally attended from ages 12 to 15) is the maximum for 6.5% of the respondents, while 9.5% report having finished professional or technical schooling and 7.5% finished high school (*preparatoria*) or higher education (university).<sup>6</sup> Moreover, 6.8% say that they are able to speak an indigenous language. The majority lives in cities with 100,000 or more inhabitants (61.5%, reference category), and only 15% live in towns with fewer than 2,500 inhabitants.

We include five indicators of respondents' health status.<sup>7</sup> A general, subjective indicator is self-assessed health, measured on a five-point scale (poor, fair, good, very good, or excellent health). Another variable indicates whether the respondent suffers from a chronic disease (hypertension, diabetes, cancer, respiratory illness, heart disease, stroke, or arthritis), while we also include a dummy variable that indicates a serious mental health problem. Furthermore, we include two indicators

6. Construction of potential wages would have allowed the estimation of wage elasticities, as is common in the empirical child care literature (see, for example, Connelly and Kimmel, 2003; Michalopoulos and Robins, 2002; Connelly, 1992; Borra, 2010). We prefer to include age, education, and labor history in the main model, allowing them to have direct effects on the decisions, instead of including them only in the wage equation and assuming that their effects run exclusively through potential wages.

7. van Gameren (2008, 2010) presents evidence for Mexico that health is not endogenous to the explanation of labor force participation. There is little evidence in the literature that health is affected by elderly care activities, the strongest effect being a (negative) one on mental health (Coe and Van Houtven, 2009; Schmitz and Stroka 2013).

that report the respondent's limitations in regard to activities of daily living (ADL, applying a measure based upon the Katz Index (Katz *et al.*, 1970; Shelkey and Wallace, 2012) that counts the number of activities a respondent reports problems with: dressing, walking across a room, bathing/showering, eating, getting into or out of bed, and using the toilet) and instrumental activities of daily living (IADL, which reflects the number of problems with preparing hot meals, shopping, taking medication, and managing money). Table 2 shows the average number of ADL and IADL problems; what is not shown is that 91.0% of the respondents do not report any ADL problems and 94.5% do not have IADL limitations.

Possession of non-business assets (total net value of real estate, investments, savings, stocks, shares and bonds, and private means of transport) says something about the resources available for obtaining private care services and the respondent's need to participate in the labor force. Spousal labor income does the same, and here perhaps a larger effect on participation could be expected because if a spouse is working it implies that he is not available for household chores.<sup>8</sup> The respondents report average assets equal to 329,632 Mexican pesos, but the spread is huge, ranging from debts of 600,000 pesos to properties with a total value of 13.7 million pesos. The average spousal monthly labor income (from salaries, bonuses, and business and farm activities including self-employment) is about 2,421 Mexican pesos (about two times the formal minimum income), but also here the range is wide, from large negative incomes up to huge positive incomes. The latter also holds for the average non-labor income of 3,775 pesos, income that includes retirement and other pensions, transfers from government programs as well as children (remittances), and income from property or assets.

#### 4. RESULTS

The first column of Table 3 shows that the driving force behind the decision to provide care to parents is the situation in which the parents encounter themselves: having one or more parents or in-laws alive is (obviously) a relevant factor (first line), and the subsequent lines

8. Note that we ignore the spouse's labor force participation and caregiving decision. We consider this a minor issue, given that the majority of men aged 50-65 work (van Gameren, 2008). In this we follow the (child) care literature, which generally considers the husband's labor decision exogenous. The earnings capacity of other household members is not included in the analysis; in a preliminary version we included the (log of the) total household consumption, but this did not add explanatory power.

indicate that the health status of the parents is of utmost importance. Parents who need help or who cannot be left alone receive support much more often than parents for whom no health problems are reported. Moreover, if the parents live in the same household as the respondent, it is much more likely that the women take care of them than when they live with the respondent's siblings (the reference category), while parents who live alone or together with their spouse receive even less support. The international evidence also finds that living arrangements are important; when the caregiver and elderly relatives live together it is more probable that the caregiver will quit her job in order to look after those relatives.

The information about the respondent's children and grandchildren does not tell us anything about the care given to parents, but the respondent's socioeconomic situation has some relevance. The household's non-labor income has a positive (though decreasing) effect on women's elderly care activities. Only those who have made contributions to a pension fund for less than 10 years are significantly less likely to provide care, in comparison with those who never contributed (the reference category) and with those who contributed longer. A longer period of contributions implies that some pension can already be claimed, while those with fewer than 10 years of contributions still have a chance to qualify for a pension if they contribute for additional years.

The second column of Table 3 shows the factors that explain the respondent's support activities for her children or grandchildren. As expected, a higher number of young household members increases the probability that children are supported. Children younger than 5 years have the strongest positive effect. For children of primary school age (5 to 12), the positive effect is half the size of the effect for pre-school aged children, while no significant effect is found for children over 12, given the positive effect of the number of (great) grandchildren in the household. It is interesting that the number of nonresident grandchildren has no direct effect on child support activities, in contrast with the number of (great)grandchildren in the household. However, if the respondent has nonresident grandchildren aged under 18, her child support activities are significantly greater.

Also interesting is that, apart from the relevance of young (grand) children, the presence of elderly relatives in need of care has a positive effect on child support activities. Something similar was found by Giménez-Nadal *et al.* (2010), who conclude that the presence of

Table 3. Joint LTC, child care, and labor force participation decision

	[1]	[2]	[3]
	Elderly care	Child support	Employment
<b>Parents</b>			
#parents/inlaws alive	0.259 *** (0.040)	0.017 (0.028)	0.031 (0.028)
#parents/inlaws who need help	0.901 *** (0.061)	0.108 ** (0.046)	0.092 ** (0.044)
#parents/inlaws cannot be alone	0.254 *** (0.072)	-0.135 ** (0.057)	-0.087 (0.055)
#par./inlaws living with respondent	0.817 *** (0.093)	-0.148 * (0.081)	0.001 (0.081)
#par./inlaws living alone/spouse	-0.138 *** (0.050)	-0.043 (0.033)	-0.044 (0.033)
<b>(grand)children</b>			
#nonresident. grandchildren	-0.006 (0.005)	-0.001 (0.002)	-0.001 (0.003)
nonresident grandchildren under 18	0.024 (0.074)	0.515 *** (0.046)	0.032 (0.045)
#(great)grandchild in hh	-0.050 (0.050)	0.126 *** (0.030)	0.063 ** (0.028)
#hh-members aged 0-4 years	0.004 (0.079)	0.201 *** (0.047)	-0.117 *** (0.043)
#hh-members aged 5-11 years	0.018 (0.060)	0.103 *** (0.037)	-0.059 * (0.035)
#hh-members aged 12-17 years	0.044 (0.044)	-0.025 (0.027)	-0.038 (0.026)
<b>Sociodemographic background</b>			
married/living together	-0.156 ** (0.073)	-0.004 (0.040)	0.002 (0.040)
#siblings alive	0.022 ** (0.010)	0.010 * (0.006)	0.004 (0.006)
age	0.222 ** (0.090)	0.094 * (0.049)	-0.062 (0.049)
age squared (*100)	-0.208 *** (0.079)	-0.094 ** (0.042)	0.019 (0.043)
educ.: primary	0.083 (0.082)	0.093 ** (0.045)	0.088 ** (0.044)
educ.: secondary	0.155 (0.134)	0.108 (0.079)	0.284 *** (0.079)

Table 3. (continued)

	[1]		[2]		[3]	
	Elderly care		Child support		Employment	
educ.: technical/commercial	0.320 ***	(0.121)	0.169 **	(0.074)	0.190 **	(0.074)
educ.: preparatory or higher	0.039	(0.157)	0.321 ***	(0.087)	0.331 ***	(0.088)
speaks indigenous language	-0.165	(0.127)	-0.011	(0.069)	0.008	(0.068)
locality size: 15000-100000 inhab.	0.185 **	(0.080)	-0.076	(0.048)	0.109 **	(0.049)
locality size: 2500-15000 inhab.	0.236 **	(0.102)	-0.261 ***	(0.064)	0.158 **	(0.063)
locality size:less than < 2500 inhab.	0.187 **	(0.095)	-0.260 ***	(0.054)	0.185 ***	(0.054)
<b>Socioeconomic background</b>						
non-business assets (*\$1mln)	0.050	(0.082)	-0.036	(0.050)	-0.020	(0.053)
squared non-business assets	-0.007	(0.010)	0.000	(0.006)	0.003	(0.007)
hh nonlabor income (*\$10,000)	0.139 *	(0.074)	0.020	(0.012)	-0.074 **	(0.030)
squared hh nonlabor income	-0.021 **	(0.010)	-0.000	(0.000)	0.002 *	(0.001)
spousal labor income (*\$10,000)	0.013	(0.020)	-0.005	(0.011)	-0.027 *	(0.016)
squared spousal labor income	-0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
access to medical services	0.090	(0.066)	0.192 ***	(0.039)	-0.150 ***	(0.039)
made pension deposits, 1-10 years	-0.337 **	(0.150)	-0.104	(0.083)	0.338 ***	(0.083)
made pension deposits, 10-25 years	-0.014	(0.120)	-0.093	(0.077)	0.587 ***	(0.078)
made pension deposits, >25 years	0.027	(0.142)	-0.038	(0.086)	0.304 ***	(0.087)

Table 3. (continued)

	[1]		[2]		[3]	
	Elderly care		Child support		Employment	
<b>Health status</b>						
self-assessed health (0-4)	-0.042	(0.040)	0.008	(0.024)	0.043 *	(0.024)
problem with ADL	0.036	(0.053)	0.068 **	(0.032)	0.008	(0.030)
problem with IADL	-0.146	(0.096)	-0.156 ***	(0.051)	-0.149 ***	(0.051)
suffers a chronic disease	0.124 *	(0.064)	0.078 **	(0.037)	0.027	(0.037)
poor mental health status	0.042	(0.089)	0.139 ***	(0.052)	0.061	(0.052)
Constant	-8.226 ***	(2.523)	-3.136 **	(1.402)	2.585 *	(1.407)
$\rho_{12}$	0.145 ***	(0.036)				
$\rho_{13}$	-0.021	(0.036)				
$\rho_{23}$	-0.019	(0.021)				
Wald $\chi^2$ test <sup>a</sup>	794.0 ***	$p = 0.000$	536.2 ***	$p = 0.000$	482.2 ***	$p = 0.000$
Number of observations	6037					
Log likelihood	-8925.8					

Source: Authors' calculations based on the MHAS 2001 survey.

<sup>a</sup> Wald-tests that all parameters equal zero (except the constant); in each equation a  $\chi^2(35)$  distribution applies. Robust standard errors; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

children during elderly care activities increases the time devoted to both elderly and child care as primary activities. It is possible that “economies of scale” may be at work in Mexico, in the sense that the grandchildren are around and cared for while care is also provided to the elderly, but a demonstration effect as suggested by Giménez-Nadal *et al.* (2010, 2012) cannot be discarded. If the elderly cannot be left alone, combining care activities appears to be less feasible, as reflected by the significantly negative parameter estimate. The negative effect of the number of parents/in-laws in the same household on the respondent’s child support activities reflects another kind of scale benefit: the co-resident elderly can take care of the younger household member, enabling the respondent to spend time on other activities. We find that spousal and non-labor income, wealth, and pension rights do not explain child support activities. In the child care literature (Blau and Currie, 2004) it is common to find that mothers with higher potential wages work more and spend less time with their children. Under the presumption that higher education comes with higher potential wages, our results appear to contradict the general finding regarding child care, but it is important to consider that we are not (only) looking at mothers’ time with their own children but (mainly) at the time grandmothers spend with grandchildren. Moreover, education is not the only indicator of earnings capacity. Access to health care services provided by the social security system has a positive effect on within-family child support activities. A negative effect was expected, because child care services are provided through the same social security institutes; however, access to social security is also an indicator of a better socioeconomic status that may make it feasible to stay at home and provide support activities for children.

The third column of Table 3 presents the respondent’s labor force participation decision. Here, the economic situation has a stronger effect. In particular, the existence of other incomes in the household, access to health care services, and previous pension contributions are relevant. Access to the health care services offered by the social security system, possibly acquired through working family members, reduces the likelihood that the respondent is active in the labor market. If, however, the respondent has made contributions to a retirement pension in the past, it is more likely that she is still working. Past contributions tell us something about the labor experience of the respondent, as contributions not only indicate a history of formal

employment but also more generally that the respondent has not been exclusively dedicated to household chores all her life. In general, it suggests a strong connection with the labor market and therefore the capacity to earn income. The latter is also determined by the level of education achieved, a variable that is also found to be significant in our analysis. Education in general, and secondary or higher levels of education in particular, raise the probability of working. Furthermore, we find that the household's non-labor income and spousal labor income lead to a significant reduction in the probability that the respondent has a job; this is in line, for instance, with Chang and White-Means (1995), who found non-wage income to be a significant variable affecting negatively caregivers' decision to work outside the home. We find no evidence that household wealth has an effect on the respondent's labor force participation decision.

The presence of needy elderly relatives and grandchildren has a small positive effect on the respondent's labor force participation decision. When parents are in need but can still be left alone, and when there are more grandchildren but not any younger than 12 years, additional care needs are probably relatively minor; perhaps another household member takes care of both the elderly and (older) children, permitting the respondent to spend more time on employment in order to acquire additional resources that can be used for care activities. With relatively limited care needs, scale benefits are easier to achieve and leave time for other activities.

Hence, decisions to support the elder and younger generations are primarily governed by the need factors that we would have expected (and some cross-effects), where traditional roles and expectations probably constitute an important underlying reason, but due to inherent measurement problems they are not fully observable. Economic factors are important for the labor force participation decision, but cross-effects on care decisions cannot be ignored. In addition, we find a variety of effects of other background characteristics that suggest interrelationships between the three decisions. For example, the estimates suggest that the maximum burden of elderly care activities is found among women aged 53.3, while for child support activities the maximum occurs at the age of 50.4, and no pattern is found for paid labor. At higher ages it becomes unlikely that there are still living parents around and there will be fewer young children around. While no health effects on elderly care are found, the respondent's own health is relevant in child support activities and labor decisions. The presence of ADL-problems, which do not impede

independence in regard to skills such as food preparation and hence do not hinder “light” child support (including companionship), increases the probability that the respondent provides child support activities. But when the respondent suffers IADL problems—when serious aging-related dysfunction and reduction of independence starts—a reduction in child support activities and labor force participation is found. Those who perceive their health as good are more likely to be active in the labor market.<sup>9</sup> If the respondent has a spouse, less care is provided to the parents, but there are no effects on the other decisions. It seems that for unmarried women it is easier to take up care activities for her parents, perhaps because her siblings consider it the responsibility of their unmarried sisters. A small positive effect on caregiving is found if the respondent has more siblings. In the literature it is more common to find that more siblings imply a reduction of care activities for each of them (Nizalova, 2012) and care for the elderly is replaced by work activities.<sup>10</sup> Perhaps the interaction of elderly care duties with migration decisions, as indicated by Antman (2012), may lead to the unavailability of siblings for caregiving and reduce substitution among the various siblings.

Joint decision-making is also implied by the estimates of the correlations between the unexplained parts of the decisions. In particular,  $\rho_{12}$  is significantly positive, suggesting that there are unobserved factors that increase both types of caregiving. A preference for caregiving by the women in our sample, but also traditional role models or habits may be at work. Giménez-Nadal *et al.* (2010, 2012) also found a positive relation between child care and elderly care: When children are present while care is being provided to the elderly, there is a booster effect on the total time devoted to caregiving. Unmeasured factors appear less important to the relationship between elderly care and employment ( $\rho_{13}$ ) as well as between child support activities and labor force participation ( $\rho_{23}$ ). Caregiving activities and labor force participation do not seem to affect each other in ways that are not captured by the observed variables.

9. In a model without (subjective) self-assessed health, the role of other health indicators hardly changes. When mental health—perhaps the health indicator that is most susceptible to endogeneity (Schmitz and Stroka, 2013)—is left out of the analysis, the results reported in Table 3 are maintained. Completely eliminating the health information from the model results in only minor changes in the other parameters.

10. This somewhat surprising siblings effect disappears if the parental living situation, with ‘living with siblings’ as the reference category, is excluded from the analysis. An explanation for the siblings effect we found could be that the other siblings want to share the burden of care with the sibling who houses the parent(s).

#### 4.1 Robustness checks

We performed a variety of robustness checks in subsamples of the data set. Specifically, we ran the analysis separately for respondents living with and without a partner, respectively, because having a partner implies differences in potential care needs as well as different opportunities to share the burden. There are some minor differences in the effects found in the two subsamples, but overall the effects are maintained. The needs effect (having parents who are alive, parents in need of care) on elderly care is much larger among women living alone than those living with a partner. For the latter, on the other hand, the age pattern becomes more pronounced for elderly care and for labor force participation, and the relevance of education increases for all three decisions, while age and education effects almost disappear among single women. Among single women we see a stronger effect on participation of earlier contributions to pension funds. The differences may suggest that single women provide care whenever necessary but are also more inclined to work when possible.

Because caregiving responsibilities may differ among age groups, as demonstrated by the age patterns implied by the estimates in Table 3, for example because older women are traditionally less inclined to work outside the home and are less likely to have living parents, we also ran the analysis separately for the younger women in our sample (aged 45-54) and for the older ones (aged 55-69). Indeed, in the older age group we find hardly any effects due to socioeconomic conditions except the pension contribution history, which may directly translate into a future pension; meanwhile, in the younger group socioeconomic conditions are important and other incomes in the household reduce the participation probability. Also, in the older group care needs are more important for explaining specific care activity than in the younger group; in the latter the cross-care effects disappear, while in both groups care needs have hardly any explanatory power for the labor decision. What is particularly interesting is that education level is particularly relevant in the labor decision of the younger age group.

In addition, we ran separate analyses for urban areas with more than 100,000 inhabitants and semi-urban and rural areas because the availability of external services may be more limited in semi-urban/rural areas than in large cities; also, family ties may be stronger and attitudes towards non-family care more negative. Nevertheless, the results regarding care needs are fairly similar; an exception is the

care provided when parents/in-laws live alone or with a spouse, for which the negative relation reported in Table 3 was found only in urban areas. Apparently, respondents in large cities provide less care to their parents, perhaps because the latter do not live in the same city. The socioeconomic situation of the respondent turns out to be much more relevant for participation decisions in large cities, while it is almost irrelevant in more rural areas. Differences in the labor market structure and the role of migration from peripheral areas to large cities may be behind the different relations.

## 5. SIMULATIONS

In order to give a clearer idea of the implications of the estimation results, we present simulations in which we compare the caregiving and labor decisions of typical persons and household situations. The selected simulations reflect demographic trends that are observed in Mexico and indicate how caregiving and participation decisions at the individual level could change due to these trends. Table 4 shows the results of the simulations, in which we fixed a combination of individual characteristics at specific values and used the observed values for all other characteristics to predict the three outcomes (using the estimates in Table 3) for each respondent and calculate the average probabilities.

The global population aging trend, reflected by a larger share of older people in the population and therefore a higher average age, is also occurring in Mexico (Zúñiga Herrera, 2004). In an aging population, it becomes more likely that people aged between 45 and 69 years old have living parents who either need help and cannot be left alone or who are in good health and do not need care. The larger share of elderly people in the population is accompanied by a prospective reduction in the number of young people. In Table 4 (Panel I) we combine these trends in potential scenarios and present the simulated participation in the three modeled activities.

The simulations in panel I of Table 4 suggest that increased elderly care needs due to more living parents are not necessarily made up for by the interaction of expected health improvements of the parents and smaller numbers of young grandchildren; full compensation is found only if none of the parents need care (scenario C). The smaller number of grandchildren and their older ages drastically reduces the probability that women aged 45-69 are expected to provide child support activities. However, the increase in the labor force participation rate does not

Table 4. Probabilities of LTC, child care, and employment

	Pr[elderly care]		Pr[child support]		Pr[participation]	
<b>Panel I: More and healthier parents, fewer and older grandchildren</b>						
A <sup>a</sup>	0.195	(0.046)	0.764	(0.033)	0.402	(0.037)
B <sup>a</sup>	0.315	(0.036)	0.516	(0.028)	0.527	(0.027)
C <sup>a</sup>	0.091	(0.018)	0.475	(0.028)	0.492	(0.027)
<b>Panel II: As in panel I but for different formal labor histories</b>						
A <sup>a</sup> , never contrib. (informal)	0.199	(0.047)	0.768	(0.033)	0.378	(0.037)
B <sup>a</sup> , never contrib. (informal)	0.320	(0.036)	0.521	(0.028)	0.504	(0.027)
A <sup>a</sup> , 10-25yr with contr. (formal)	0.195	(0.054)	0.740	(0.041)	0.598	(0.047)
B <sup>a</sup> , 10-25yr with contr. (formal)	0.315	(0.053)	0.485	(0.039)	0.715	(0.034)
Source: Authors' calculations based on the MHAS 2001 survey.						
a. Scenario A: One parent alive, in need of care and cannot be left alone, three grandchildren aged under 5 in the household. Scenario B: Three parents alive, of which only one has care needs while all can be left alone, one grandchild aged 12-17 in the household. Scenario C: Same as scenario B, except that none of the parents have care needs. Standard errors (Delta method) in parenthesis.						

match the reduction of caregiving activities, especially in the scenario with more living parents when none of them need care, suggesting that care and work activities do not unambiguously compete for the time of middle-aged Mexican women. Other reasons such as traditions and attitudes regarding work may be expected to be important. It is important to remember that female labor force participation in Mexico is already rather low compared with other OECD and Latin American countries (Arceo and Campos, 2010; van Gameren, 2010), and that with an aging population, the share of working-age people will decline. In such a situation the participation rate should increase substantially to maintain the same production levels, where only a minor increase is suggested by our simulations.

Panel II presents scenarios A and B separately for women who have been more attached to the labor market in earlier years (last two lines, between 10 and 25 years of contributions) and for those who have never been attached to the formal labor market (first two lines, never made pension deposits). Women with a strong connection to the formal labor market are much more likely to continue their participation in the labor market than women who have not worked formally before. The labor market history in itself does not affect incentives for caregiving; the probabilities of providing child support activities and elderly care reported in panel I remain rather similar when calculated

separately for the labor market connection, but in combination with the other demographic trends, the observed changes in the labor force participation of Mexican women—nowadays participation among young women is higher than for the generation represented in our data—will have important consequences for the availability of caregivers that may go beyond what we can highlight with our analysis.

Note that we have not imposed restrictions on the feasibility of the simulated outcomes; these are partial results assuming that there are no changes in behavior, the household environment, and other circumstances (a structural model would only partially overcome these drawbacks). The results are indicative of what could happen if there are no other changes. In particular, feasibility will depend on the drastically changing shares of the various age categories in the population; a lower individual propensity of women aged 45-69 to provide elderly care might not be tenable if the number of elderly with care needs increases faster than the number of women aged 45-69. They are more likely to be feasible if the population aging process is accompanied by health improvements, that is, by a growth in the number of years of good health more than by longer life expectancy in itself, because it is less likely that a conflict between elderly care and labor will arise.

## 6. CONCLUSIONS

We have analyzed simultaneous decisions made by Mexican women aged 45 to 69 years regarding labor force participation, caring for parents (known as elderly or long-term care), and providing support activities to (grand)children. A tradition of extended families in which multiple generations live together in combination with limited availability of affordable (public or private) elderly and child care facilities implies a large dependence on informal support activities for the elderly and (grand)children. The estimation results of a reduced form, seemingly unrelated regression (SUR) model confirm that care needs, rather than the economic situation, are the driving force behind caregiving activities. Having parents or in-laws with health problems strongly increases the probability that elderly care is provided, but also has (small) effects on provision of child support activities and labor force participation. Young grandchildren raise the probability that the respondent provides support activities to (grand)children, while it slightly reduces the probability of labor market activities. Hence, care

needs not only increase the care activity required, but also have some relevance for other activities.

Economic considerations are the greatest component of the participation decision. Income from other sources reduces labor force participation and has a (smaller) positive effect on the probability that elderly care is provided. Women with a close connection to the formal labor market earlier in their lives are more likely to work, a connection that nonetheless has no effect on caregiving activities, signalling a potential double burden of care and work for those women. The important effect of own earnings capacity on labor force participation is evidenced by the role of educational levels—a higher level of education predicts participation—and women who report better health (fewer health problems) are more likely to be active in the labor market and less likely to perform caregiving activities. In general, traditional roles that prescribe that women provide care when necessary appear to be relevant, but in addition we find several indications of the interdependence of the three decisions analyzed. Furthermore, we find evidence that there are other (unobserved) characteristics that increase both types of caregiving activities: preferences as well as scale effects may be behind the interdependencies.

We have illustrated potential future caregiving and participation rates with simulations of demographic changes in Mexico reflecting the aging population. Although the Mexican population is still rather young compared to many (Southern) European countries, the onset of an aging population is observable, with reductions in both fertility and mortality rates. A scenario with more parents living but in better health than the elderly in our sample, in combination with fewer and older grandchildren, is likely to reduce individual care needs but lead to only a small increase in labor force participation rates. Increased participation rates can be expected if future generations of women have a stronger connection to the (formal) labor market.

Taken together, our results highlight that an expansion of the affordable (public) provision of elderly care and/or child care will not replace informal caregiving on a wide scale, since informal care provision is an embedded habit for many; expansion of affordable services may have relatively small consequences on caregiving and work decisions and therefore on the burden involved. Nevertheless, it is important to be aware that for the scenarios, we assume the absence of behavioral changes among the generation in the middle, something that is

unlikely in the long run. Drastically changing shares of age groups in the population, in particular a faster increase in the number of older elderly persons in need of care than in the number of women available for caregiving activities, combined with increases in the labor force participation rates of younger women, may imply that current informal care activities are not tenable and behavioral changes are unavoidable.

That the expansion of public subsidies for or provision of caregiving may lead to the reduction of private or informal care has been shown in various countries. Mexico is not likely to be different; results by Juarez (2009) indicate that the expansion of public pension transfers almost completely crowded out private financial support given to the elderly. Additionally, the availability and accessibility of more services for the elderly and children may have an effect on quality of life and the well-being of those caregivers who feel burdened by their care tasks, especially for those who combine care with paid work or feel forced to consider providing care and working simultaneously. Traditions, attitudes, and opinions about caregiving may change and the consequence may be greater willingness to consider and use external services (public or private). For that to be successful, not only affordability but also quality and safety of the services must be guaranteed.

## REFERENCES

- Antman, F.M. (2012), "Elderly care and intrafamily resource allocation when children migrate," *Journal of Human Resources* **47**(2): 331–63.
- Aranibar, P. (2001), "Acercamiento conceptual a la situación del adulto mayor en América Latina," CEPAL Serie Población y Desarrollo No. 21, Santiago de Chile.
- Arceo Gómez, E.O. and R.M. Campos-Vázquez (2010), "Labor supply of married women in Mexico: 1990-2000," El Colegio de México, Centro de Estudios Económicos, Documento de Trabajo No. 2010-16.
- Blau, D.M. and J. Currie (2004), "Preschool, daycare, and afterschool care: Who's minding the kids?" National Bureau of Economic Research Working Paper 10670, Cambridge, MA.
- Bolin, K., B. Lindgren, and P. Lundborg (2008), "Your next of kin or your own career? Caring and working among the 50+ of Europe," *Journal of Health Economics* **27**: 718–38.
- Borra, C. (2010), "Childcare costs and Spanish mothers' labour force participation," *Hacienda Pública Española / Revista de Economía Pública* **3**/2010 (194): 9–40.
- Burniaux, J.-M., R. Duval, and F. Jaumotte (2004), "Coping with ageing: A dynamic approach to quantify the impact of alternative policy options on future labour supply in OECD countries," OECD Economics Department Working Paper No. 371, Paris.
- Carmichael F. and S. Charles (1998), "The labour market costs of community care," *Journal of Health Economics* **17**: 747–65.
- Carmichael F. and S. Charles (2003), "Benefit payments, informal care and female labour supply," *Applied Economics Letters* **10**(7): 411–15.
- Carmichael F., S. Charles, and C. Hulme (2010), "Who will care? Employment participation and willingness to supply informal care," *Journal of Health Economics* **29**: 182–90.
- Chang, C.F. and S.I. White-Means (1995), "Labour supply of informal caregivers," *International Review of Applied Economics* **9**(2): 192–205.
- CISS (2005), "The challenges of aging and disability: Employment and insurance, international social security agreements," in The Americas Social Security Report 2006, Inter-American Conference on Social Security/CISS, Mexico City.
- CISS (2008), "Evaluation of childcare and long-term care programs," in The Americas Social Security Report 2009, Inter-American Conference on Social Security/CISS, 77–91.
- Coe, N.B. and C.H. Van Houtven (2009), "Caring for mom and neglecting yourself? The health effects of caring for an elderly parent," *Health Economics* **18**(9): 991–1010.
- CONEVAL (2011), Informe de la Evaluación Específica de Desempeño 2010-2011. Programa de Estancias infantiles para apoyar a madres trabajadoras. Mexico City, CONEVAL, Available online at [http://www.coneval.gob.mx/Evaluacion/Eval\\_Especificas/Paginas/EED%202010-2011/EED-SEDESOL-2010-2011.aspx](http://www.coneval.gob.mx/Evaluacion/Eval_Especificas/Paginas/EED%202010-2011/EED-SEDESOL-2010-2011.aspx)

- Connelly, R. (1992), "The effect of child care costs on married women's labor force participation," *Review of Economics and Statistics* **74**: 83–90.
- Connelly, R. and J. Kimmel (2003), "The effect of child care costs on the employment and welfare reciprocity of single mothers," *Southern Economic Journal* **69**(3): 498–519.
- Cox, D. and O. Stark (2005), "On the demand for grandchildren: Tied transfers and the demonstration effect," *Journal of Public Economics* **89**: 1665–97.
- Ettner, S.L. (1996), "The opportunity costs of elder care," *Journal of Human Resources* **31**(1): 189–205.
- Fevang, E., S. Kverndokk, and K. Røed (2008), "A model for supply of informal care to elderly parents," Health Economics Research Programme, University of Oslo, Working Paper 2008:12.
- Fevang, E., S. Kverndokk, and K. Røed (2012), "Labor supply in the terminal stages of lone parents' lives," *Journal of Population Economics* **25**: 1399–1422.
- Giménez-Nadal, J.I., M. Marcén, and J.A. Molina (2007), "How does the presence of children affect adult care and labour decisions? A psycho-economic approach," Institute for the Study of Labor, IZA Discussion Paper 2726.
- Giménez-Nadal, J.I., M. Marcén, and R. Ortega (2010), "How do children affect parents' allocation of time?" *Applied Economics Letters* **17**(17): 1715–9.
- Giménez-Nadal, J.I., M. Marcén, and R. Ortega (2012), "Substitution and presence effects of children on mothers' adult care time," *Journal of Family and Economic Issues* **33**: 2–10.
- Hammer, L.B. and M.B. Neal (2008), "Working sandwiched-generation caregivers: Prevalence, characteristics, and outcomes," *The Psychologist-Manager Journal* **11**: 93–112.
- Heitmueller, A. (2007), "The chicken or the egg? Endogeneity in labour market participation of informal carers in England," *Journal of Health Economics* **26**: 536–59.
- Juarez, L. (2009), "Crowding out of private support to the elderly: Evidence from a demogrant in Mexico," *Journal of Public Economics* **93**: 454–63.
- Juarez, L. (2010), "The effect of an old-age demogrant on the labor supply and time use of the elderly and non-elderly in Mexico," *The B.E. Journal of Economic Analysis and Policy* **10**(1): 1–27.
- Katz, S., T.D. Downs, H.R. Cash, and R.C. Grotz (1970), "Progress in development of the index of ADL," *The Gerontologist* **10**(1 Part 1): 20–30.
- Leigh, A. (2010), "Informal care and labor market participation," *Labour Economics* **17**: 140–9.
- Lilly, M.B., A. Laporte, and P.C. Coyte (2007), "Labor market work and home care's unpaid caregivers: A systematic review of labor force participation rates, predictors of labor market withdrawal, and hours of work," *The Milbank Quarterly* **85**(4): 641–90.
- Meng, A. (2013), "Informal home care and labor-force participation of household members," *Empirical Economics* **44**(2): 959–79.

- Michalopoulos, C. and Ph.K. Robins (2002), "Employment and child-care choices of single-parent families in Canada and the United States," *Journal of Population Economics* **15**: 465–93.
- Miller, D.A. (1981), "The 'sandwich' generation: Adult children of the aging," *Social Work* **26**(5): 419–23.
- Murrugarra, E. (2011), "Employability and productivity among older workers: A policy framework and evidence from Latin America," *Well-being and Social Policy* **7**(2): 53–99.
- Nizalova, O. (2012), "The wage elasticity of informal care supply: Evidence from the health and retirement study," *Southern Economic Journal* **79**(2): 350–66.
- Nocera, S. and P. Zweifel (1996), "Women's role in the provision of long-term care, financial incentives, and the future financing of long term care," in R. Eisen and F.A. Sloan, eds., *Long-term care: Economic issues and policy solutions*, Boston: Kluwer Academic Publishers.
- OECD (2012), OECD Family Database, Paris: OECD (Available online at [www.oecd.org/social/family/database](http://www.oecd.org/social/family/database)).
- Pommer, E., I. Woittiez, and J. Stevens (2007), "Comparing care. The care of the elderly in ten EU-countries," The Netherlands Institute for Social Research / SCP The Hague.
- Puig, A., J.A. Pagán, and B.J. Soldo (2006), "Envejecimiento, salud y economía: La Encuesta Nacional sobre Salud y Envejecimiento en México," *El Trimestre Económico* **73**: 407–18.
- Ribar, D.C. (1992), "Child care and the labor supply of married women," *Journal of Human Resources* **27**: 134–65.
- Rubin, R.M. and S.I. White-Means (2009), "Informal caregiving: Dilemmas of sandwiched caregivers," *Journal of Family and Economic Issues* **30**: 252–67.
- Schmitz, H. and M.A. Stroka (2013), "Health and the double burden of full-time work and informal care provision — Evidence from administrative data," *Labour Economics* **24**: 305–22.
- Shelkey, M. and M. Wallace (2012), "Katz index of independence in activities of daily living (ADL)," in *Try this: Best practices in nursing care to older adults*, Issue 2, The Hartford Institute for Geriatric Nursing, New York University. Available online at [http://consultgerirn.org/uploads/File/trythis/try\\_this\\_2.pdf](http://consultgerirn.org/uploads/File/trythis/try_this_2.pdf)
- Spillman, B.C. and L.E. Pezzin (2000), "Potential and active family caregivers: changing networks and the 'sandwich generation,'" *The Milbank Quarterly* **78**(3): 347–74.
- Tekin, E. (2007), "Child care subsidy, wages, and employment of single mothers," *Journal of Human Resources* **42**: 453–87.
- van Gameren, E. (2008), "Labor force participation of the Mexican elderly: The importance of health," *Estudios Económicos* **23**(1): 89–127.
- van Gameren, E. (2010), "Labor force participation by the elderly in Mexico," Centro de Estudios Económicos, El Colegio de México, Documento de Trabajo No. 2010-6.

- Wolf, D.A. and B.J. Soldo (1994), "Married women's allocation of time to employment and care of elderly parents," *Journal of Human Resources* **29**(4): 1259-76.
- Wong R., M. Espinoza, and A. Palloni (2007), "Adultos mayores mexicanos en contexto socioeconómico amplio: salud y envejecimiento," *Salud Pública de México* **49**: S436-S447.
- Zúñiga Herrera, E. (2004), "Tendencias y características del envejecimiento demográfico en México," in Consejo Nacional de Población (CONAPO), *La situación demográfica de México*, 31-42.