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Caregiving across generations: Do older adults with more grandchildren get another bite at the "sandwich" generation?

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ABSTRACT

Understanding the influence of grandchildren on long-term care use is a growing issue. Indeed, many countries, middle-aged adults provide unpaid care for aging family members, often their parents, at home. Although the influence of adult children's availability on their aging parents' caregiving decisions has been widely studied, the influence of grandchildren remains largely unstudied. Parental time allocated to childcare may compete with elder care, necessitating paid home care or transfer to a nursing home. Alternatively, grandparents may provide childcare, increasing incentives to keep grandparents at home. Using data from the Survey of Health, Ageing and Retirement in Europe (75,296 observations from 11 countries covering years 2004–2018), we exploit an instrumental variable strategy to study the effect of grandchildren on grandparents' long-term care decisions, specifically, use of paid home care or transfer to a nursing home. We use the generosity of maternity leave policies in time and across countries as an instrumental variable to identify the effect of the number of grandchildren. We find that the presence of grandchildren significantly increases the likelihood of having grandparents live at home: the probability of paid home care significantly increases while the probability of nursing home admission falls significantly. In conclusion, policies influencing the number of grandchildren in families have an indirect impact on long-term care use trajectories, confirming that family policies and long-term care policies are strongly imbricated and should not be considered separately.

1. Introduction

Across OECD countries, family members are essential care providers for older people with physical or cognitive impairment (Grabowski, 2014). The supply of unpaid family care, i.e., informal home care, represents one of the main determinants of long-term care (LTC) spending (Costa-Font et al., 2015). Indeed, recent data show that most people over 65 years of age report receiving unpaid care provided by a family member or a close relative (OECD, 2021). With the population aging, children of people over 80 years old, who are for the most part themselves in their 60's, will play an increasing role in their parents' care provision (OECD, 2020).

This scenario poses new challenges to the design of LTC policies and especially to a system that relies on unpaid family caregiving. Indeed, adult children have been termed the "sandwich" generation. They have dual responsibilities to care for their parents (referred to here as grandparents, or the 1st generation) and to care for their own children (referred to here as grandchildren, or the 3rd generation). Given the presence of obvious time constraints, the question emerges as to how the presence of grandchildren might affect grandparents' LTC decisions. Indeed, when adults have children themselves, they may reduce the supply of unpaid or informal care that they provide to their older parents due to time constraints. However, the effect may depend on the provision of care by grandparents (generation 1) to their grandchildren (generation 3), which may in turn increase the incentives for grandparents to remain in the home. Finally, a greater number of grandchildren (generation 3) could reduce the availability of members of the "sandwich" generation (generation 2) as care providers for their parents (generation 1).

While there is a wide empirical and theoretical literature on family decision making about informal caregiving (see Klimaviciute and Pestieau (2022) for an overview), anticipating the impact of grandchildren on grandparents' decisions to use paid home care is not straightforward. Indeed, although the availability of family care providers is known to be

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a strong predictor of paid care use across most European countries (Bakx et al., 2015), the presence of grandchildren could have two opposite effects in theory. On one hand, a larger family would increase the chances of having a family caregiver available and therefore lower the probability of using paid care. Indeed, family or social norms of care reciprocity can motivate family care provision. Having many grandchildren may be associated with social norms and culture that emphasize help within the family, and living close to one another or even sharing housing. In turn, these social norms may also be associated with certain types of social and labor policy that in turn lead to heavy reliance on informal care, low female labor force participation. For example, the "sandwich" generation (generation 2) might feel an obligation to take care of grandparents who had previously helped to care for the grandchildren. On the other hand, having more grandchildren implies more work for the "sandwich" generation, who because of household time constraints face the challenge of sharing their available time between their parents and their own children. Consequently, having many grandchildren may lead to less informal caregiving from adult children as long as these grandchildren require attention from the adult children.

Because of these two potential effects in opposite directions, the relationship between the number of grandchildren and the choice of the mix of formal and informal care is an empirical question requiring further analysis. This article explores two symmetric and related questions, namely, (1) whether older people use less (or more) paid home care, i.e., formal home care that allows them to remain at home, when they have many grandchildren, and what are the main drivers of such choices, and (2) the extent to which older people have a greater (or lower) chance of avoiding nursing home care when they have many grandchildren.

Specifically, our objective is to study the effect of grandchildren on two related LTC decisions by grandparents: (1) the use of paid home care, which keeps grandparents at home, and (2) use of nursing home care, which does the opposite. Our explanatory (quasi-treatment) variables of interest are the number of grandchildren in a family and the ratio of grandchildren to children, because it provides additional information on the availability of adult care providers. Exploring these questions raises methodological issues, because the presence (and number) of grandchildren *and* LTC decisions are jointly determined by adults and grandparents and may both be affected by unobserved factors (omitted variables). Hence, plausibly exogenous variation in the number of grandchildren is required to assess the causal effect of grandchildren on grandparents' LTC decisions. Our identification strategy relies on exploiting policy changes in the total weeks of paid maternity leave within countries over time. These parental and home care payments available to mothers across countries are collected from OECD family data and are expected to influence the presence and/or the number of grandchildren within a family but are unrelated to the decision (typically years later) as to whether grandparents remain in the community.

This article makes two main contributions to the literature. First, we provide new evidence documenting an effect of changes in grandparents' childcare support (i.e., care of grandchildren by grandparents) on the supply of care to grandparents provided by their adult children. This finding speaks to a wider inquiry on the question of reciprocity or exchange in explaining caregiving decisions, namely whether care (to grandchildren from grandparents, which eases the time constraints on their adult children) begets care (from children to the adult grandparents). Furthermore, another alternative explanation lies in the role of social norms. Consistently, we document how a change in intergenerational caregiving norms after a policy intervention – paid maternity leave – may not only expand support of child care, which is expected, but also surprisingly reduce the need for adult care of the grandparents, which influences the supply of LTC by adult children. Second, we contribute by drawing on evidence for an instrument that is not commonly used in the LTC literature, namely the extension of paid maternity leaves, measured by the total weeks of paid maternity, i.e., parental and home care payments available to mothers. The theoretical validity of the instrument lies in that it exogenously modifies the need for grandparents' involvement in providing the so-called '*care by default*' to their grandchildren, and hence provides some exogenous variation in the arguably reciprocal nature of the intergenerational caregiving decision. Importantly, this instrument affects the number of children a couple has when couples are making fertility decisions, but then *years later* affects the need for grandparents' involvement in providing childcare to those grandchildren. We exploit this instrument to examine whether the subsequent variation in care provided to grandchildren (due to maternity leave extensions occurring earlier in time, during the period of couple's fertility decisions) changes the LTC decisions of grandparents as suggested in the recent literature (Malkova, 2018). To the best of our knowledge, this is the first time this instrument has been used in the LTC literature.

Our results show that grandparents in larger families (meaning many grandchildren) are more likely to use paid home care and less likely to be permanently admitted to a nursing home. Despite the competing time allocation to adults between providing care to their own children and to their aging parents, the net effect of grandchildren on grandparents LTC use is to keep grandparents at home. This result is consistent with the prevailing social norm in many European countries to age in place (see Costa-Font and Vilaplana (2022) for further evidence of such aging in place and the effect of health shocks), even when it involves using more paid home care. These results highlight the intergenerational impact of childcare policies, suggesting paid maternal leave is economically relevant as a policy supporting the role of family care providers. Indeed, our results suggest that the receipt of financial support by mothers from the 2nd generation to take care of newborn children influences the much later involvement of grandparents and hence affects the expectation of home care from adult children to their parents (i.e., grandparents) in the presence of competing care demands.

The paper is broken down as follows. Section 2 describes the theoretical framework and mechanisms explaining how the number of grandchildren can impact the use of LTC. Section 3 focuses on the data and econometric models. Section 4 describes the results. Section 5 provides a discussion.

2. Caregiving incentives

The interaction between paid and unpaid LTC depends not only on the opportunity costs of care, but also the presence of other constraints, including time constraints, that household members face. LTC choices often are modeled as decisions made in households with two generations, the older generation - grandparents, who typically no longer participate in the labor force - and their adult children, who face competing time allocation decisions to split their time between leisure, work, and elder care provision (Becker, 1965; Stabile et al., 2006; Byrne et al., 2009).

However, such a theoretical framework does not include grandchildren, even though they are likely to influence LTC decisions. The effects of grandchildren on LTC use by grandparents is theoretically ambiguous. Parental time allocated to childcare may compete with elder care – a household time allocation problem (Becker, 1965) – necessitating formal home care or transfer to a nursing home. Alternatively, grandparents may provide childcare, stronger family ties, and more traditional social norms, all of which may increase incentives for grandparents to remain at home. There is a lack of empirical evidence exploring the potential causal effect of grandchildren, if any, on LTC decisions by grandparents. In particular, although factors such as grandparents' conjugal status (married or in couple vs. alone), the birth order of their children, and family size have been found to influence LTC use, the impact of grandchildren has not been explored (Fontaine et al., 2009; Roquebert et al., 2018).

Related to the potential impact of grandchildren on parental time use allocation and elder care, mixed empirical evidence exists regarding the complementarity or substitutability of unpaid and paid LTC. Prior work

shows that older people receiving informal family care are less likely to use formal paid care when their disability level is low (Bonsang, 2009). However, recent articles have found mixed evidence about the impact of publicly subsidized formal home care use on informal care receipt, with studies finding evidence consistent with care complementarity (i.e., the use of informal care increases when the generosity of public programs sponsoring access to formal care increases; Carrino et al., 2018; Rapp et al., 2022), and other studies pointing to the existence of care substitution effects (i.e., the use of informal care decreases when access to publicly paid formal care services increases; Perdrix and Roquebert, 2022). The emergence of a new caregiving duty resulting from the presence of grandchildren can affect the opportunity costs of care provision by adult parents and can provide further insights on the care substitution hypothesis.

Empirically, decisions on the use of LTC use depend on observed factors, such as frailty and disability levels, presence of comorbidities, income, social supports, etc., and unobserved factors, such as households' underlying preferences and social norms influencing the substitution between paid and unpaid LTC. For instance, although nursing home care can be characterized as an inferior good where wealthier families are less likely to rely on nursing home care (Grabowski, 2014), there is evidence that in some cases it can be welfare improving for household members to permanently place a disabled parent in a nursing home, as it both improves the resident's quality of life and reduces psychological burden on the family caregiver (Rapp et al., 2018). Moreover, prior work underlines the relative inelasticity between nursing home demand and the generosity of public allowances, suggesting that price considerations are not the only determinants of nursing care use (Grabowski and Gruber, 2007).

3. Data and empirical strategy

3.1. Data and sample

We use data from the Survey of Health, Ageing and Retirement in Europe (SHARE), which provide person-wave observations for a period covering the years 2004–2018 across six waves. These data have been widely used in the literature to explore LTC decisions among older adults because they provide a longitudinal follow-up of respondents, as well as detailed information of respondents' family structures, LTC use, life habits, health, and functional status. Our sample includes 11 countries: Germany, Sweden, the Netherlands, France, Italy, Spain, Denmark, Greece, Switzerland, Belgium, and Israel. Ethical approval is described in the condition of use section of the SHARE consortium website, as data collection is subject to continuous ethics review (see the SHARE website for more information: https://share-eric.eu/data/data-access/conditions-of-use, accessed on August 21st, 2023).

Our sample consists of respondents (grandparents, 1st generation) who were over the age of 60 at the time of survey. Therefore, our focus is on people who face the presence of both grandchildren (3rd generation) and potential LTC needs. That is, we exclude from our data observations of respondents whose children ("sandwich" generation) are not in reproductive ages during the study period, e.g. are below 18 years old and over 50 years old. Note that the decision is motivated by our identification strategy, discussed in section 2.2.

We create two different analysis samples: Panel A includes 75,296 observations (41,724 respondents, 5 years of follow-up, 1.8 years of average follow-up duration), and Panel B includes 93,262 observations (44,777 respondents followed over a maximum of 6 years, with an average of 2.1 observations per respondent). The difference between both samples can be explained by the fact that questions regarding the use of home care were not included in the fifth wave of the SHARE data. We use Panel A to explore home care use decisions, and we use Panel B to explore nursing home use decisions. Note that when comparing both Panels, we find no evidence of selection, namely differences regarding the values of variables used in the two analyses (described in section 3.3).

3.2. Identification strategy

Identifying the causal effect of the number of grandchildren on LTC decisions raises the question of potential endogeneity issues. Many omitted variables may potentially confound the relationship, such as preferences for paid care and unpaid care. These omitted variables are likely to be correlated with both the decision to use LTC and the number of grandchildren in the family.

To address this issue, we draw on exogenous policy variation across countries over time from exposure to different entitlement to paid maternity leave policies. To estimate local average treatment effects, we use an instrumental variable (IV) that measures the generosity of maternity leave policies in time and across countries, which in the first stage impacts the number of children a couple has and in the second stage impacts grandparents LTC decisions through the effect these children (i.e., grandchildren) have on a) competing time allocation decisions by parents and b) incentives of parents to keep grandparents at home to provide care for grandchildren. Put differently, we explore the intergenerational link of maternal and parental leave policies.

Note that we take values of the instrument from the years during which the adult children were in age to make the decision about having the marginal additional child. Therefore, our identification strategy leads us to exclude from our analysis sample observations for grandparents whose children were not in the reproductive ages during the study period. In other words, we dropped observations when the respondent's first child was not in reproductive age or too young to benefit, e.g. under 18 years old, and when the respondent last child (if more than one) was older than 50 years old. Indeed, we are looking at the policies effect when grandparents' children are in the reproductive ages and could be benefiting from parental leave allowances.

Specifically, our IV exploits the cross-country differences in the total weeks of paid maternity, parental, and home care payments individuals are entitled to, which are available to mothers in each country, collected from the OECD family database on trends in leave entitlements around childbirth (OECD, 2022). These policies exhibit wide cross-country variation over our study period (2004–2018).

3.3. Instrument validity and relevance

Our empirical strategy relies on the assumption that the effect of parental leave policies only influences the supply of elder care via the effect on the number of grandchildren, and subsequently the availability of informal care that adult parents can provide to their own parents (i.e., grandparents). More specifically, our strategy satisfies the theoretical and empirical conditions for a suitable instrument variable (IV). First, our instrument is theoretically valid insofar as parental leave policies exert an exogenous variation in the implicit contract that underpins caregiving decisions in most European households. That is, it influences availability of childcare arrangements, and at the margin it changes the expectation for the supply of informal care assuming the presence of an exchange motive. Several reasons lead us to assume that our IV satisfies the exclusion restriction. It is very unlikely that grandparents' LTC use decisions would be directly impacted by variation in the total weeks of paid maternity, parental, and home care payments available to mothers in each country, which are policies implemented often years earlier when mothers are in reproductive ages. Indeed, although the generosity of public LTC allowances has been found to have a direct impact on health care use (Rapp et al., 2015) as well as caregiving and transfer decisions (Costa-Font et al., 2022), maternity leave allowances cannot be used to pay for elder home care or nursing home care, and countries that provide them are not among the highest relative spenders on long term care (e.g., Germany or France). Therefore, the only impact of these policies should be indirect, through their influence on the number of grandchildren and subsequently, years later, on the availability of

informal care providers. In particular, prior empirical work provided evidence that although non-linear, the effect of paid maternity leave duration on employment was positive (Thévenon and Solaz, 2013). In other words, a greater generosity of maternal leave policies may tend to increase women's employment rates, which may contribute to reduce informal care provision for older parents and impact their formal LTC use. Moreover, a literature review written by Canaan et al. (2022) also suggests that maternity leave is beneficial to both mothers and their children's health, which could have an indirect impact on informal care provision.

Despite the above justifications, one could argue that conditional on the number of grandchildren, more generous parental leave can reduce a parent's need for childcare support from a grandparent and so affect that grandparent's demand for LTC. However, because parental leave policies are limited to the period following childbirth, it is very likely that our models explore LTC decisions out of the parental leave window. Indeed, in our sample, the mean grandparents' age when they use LTC is 76 years old, while prior work shows that more than 2/3 of people under the age of 60 already have grandchildren in Europe (Van Bavel and De Winter 2013). Therefore, our analyses focus on a later period in the lifecycle and the exclusion criteria are not violated. Parental policies should influence the 2nd generations' choices during the short period of their maternity leaves, while we are looking at LTC decisions of their parents that occur many years downstream.

Note that we tested several potential IVs capturing country-level variations in maternity leave policies: number of weeks of maternity leave, number of pre-birth weeks of maternity leave, weeks of employment-protected parental leave available to mothers, regardless of income support, weeks of payments associated with parental leave available to mothers, weeks of "long-option" payments associated with parental leave available to mothers, weeks of employment-protected home care leave available to mothers, regardless of income support, duration in weeks of payments associated with home care leave, maximum weeks of employment-protected maternity, parental and home care leave available to mothers regardless of income support, total weeks of paid maternity, parental and home care payments available to mothers when they choose a "long option". We also tested several IVs capturing paternity leaves policies: weeks of paternity leave for exclusive use by the father, weeks of paid paternity leave for exclusive use by the father, weeks of leave parental and childcare leave reserved for exclusive use by the father, weeks of paid leave parental and childcare reserved for exclusive use by the father, and total weeks of paid leave reserved for exclusive use by the father". None of these variables were strong instruments as the F-tests in the first stage of the 2-stage least squares regressions were below 10.

Second, our instrumental strategy meets the standard conditions to rule out a weak instrument. Our treatment reveals wide variation across time and country, the total weeks of paid maternity leave varies over time and between the countries present in our sample (OECD, 2022). That is, our IV captures country variation that is uncorrelated with country specific trends in the demand for LTC. Indeed, when exploring the correlation between our IV and total LTC spending at the country level, we did not find a significant effect (see results obtained from a fixed-effect regression, reported in Table A1 in the Appendix). Finally, our IV is a strong predictor of the number of grandchildren in the family, which is in line with prior work (Averett and Whittington, 2001; Raute, 2019). The instrument meets the standard of Staiger and Stock, with F-statistics ranging from 1168.352 to 1797.047 depending on the specification (as reported in the regression Tables). The first stage estimates suggest that an additional week of parental leave increased the number of children by 0.02 in regressions ran in Panels A and B (as reported in the first stage regressions in Table A4), and 0.008 in regressions ran in Panels C and D (as reported in the first stage regressions for Table A5).

3.4. Econometric models

We estimate the following model:

$$Pr\ (LTC_{it}) = \beta_0 + \beta_1 K_{it} + \beta_2 X_{it} + \tau_i + c_i + u_i + \varepsilon_{it} \quad (1)$$

where: LTC_{it}, the dependent variable, measures the use of long-term care (no vs. yes) for respondent i at time t. We use two dependent variables, which indicate: (i) whether the respondent i declares at time t having used any paid home care (i.e., help with personal care, help with domestic tasks, meals-on-wheels, and/or help with other activities at home) in the last 12 months; and (ii) whether the respondent i permanently lives in a nursing home at time t. K_{it} is our independent variable of interest, which measures the number of respondent's grandchildren. X_{it} is a vector of control variables that includes age, age squared, sex, presence of a living partner (no vs. yes), income (log transformed), education level (less than upper secondary education vs. upper secondary and vocational training; less than upper secondary education vs. tertiary education), frailty status (robust vs. prefrail; robust vs. frail), number of activities of daily living (0 ADL vs. 1; 0 ADL vs. 2+), number of instrumental activities of daily living (0 IADL vs. 1; 0 IADL vs. 2+), presence of comorbidities (none vs. 1, none vs. 2, none vs. 3+), good vs. poor self-reported health, rural vs. urban living. The model also controls for year fixed effects (τ_i), and country-level fixed effects (c_i). Finally, ε_{it} is the error term. Note that because some of these variables could be seen as potentially "bad controls", we run two sets of regressions: a parsimonious regression controlling for sex, age, and age squared only, and a regression controlling for all of the above variables. While we only report results for the coefficients of our variables of interest in the main text, regressions controlling for all variables are reported in the appendix.

To deal with the potential endogeneity of K_{it} in Equation (1), we use a 2-stage generalized least squares (2 S LS) random effects regression, and we instrument for variable K_{it} with Z_{it}, our IV measuring the total weeks of paid maternity, parental, and home care payments available to mothers that are offered in respondent i's country at time t. All of our models were estimated using linear probability models, suggesting the marginal variation of each independent variable is associated with percentage point (pp) variation of the dependent variable. All regressions used robust standard errors.

We ran two main sensitivity analyses. First, we examined alternative specifications, including the effect of replacing our independent variable of interest by a variable measuring the ratio of the number of grandchildren over the number of children. Because our robustness estimates are restricted to a subsample of respondents with children and grandchildren these analyses are presented in two additional Panels: Panel C, which includes 46,434 observations (for 28,943 individuals observed on average 1.6 times), and Panel D, which includes 57,644 observations (for 31,856 individuals observed on average 1.8 times). Panels A, B, C, and D are very similar regarding the values of the variables used in our analyses (see Table 1 in section 3.1.), which reduces potential concerns on sample selection. Second, we ran our models in a subsample of parents (2nd generation) who have been employed at some point. Indeed, one could be concerned by the fact that women who have never worked in the formal labor market would not be affected by our treatment (maternity leaves) so they would not be compliers. By restricting our analyses to parents who worked in the formal labor market (Panel E: 38,201 observations), we can confirm that our main regressions estimates are consistent, suggesting estimates can be interpreted as local average treatment effects (LATE) if effects are estimated in the sample restricting to individuals that have worked at some point remain the same.

Table 1
Descriptive statistics.

Variable	Panel A		Panel B		Panel C		Panel D	
	Mean	SD.	Mean	SD.	Mean	SD	Mean	SD
Any home care use	0.09	0.28			0.1	0.3		
Lives in a nursing home			0.001	0.03			0.001	0.04
Number of grandchildren	3.63	3.40	3.61	3.36				
Ratio grandchildren/children					1.35	1.05	1.35	1.04
Age	69.66	6.79	69.63	6.8	69.56	6.67	69.55	6.68
Female	0.52	0.5	0.52	0.5	0.54	0.5	0.54	0.5
Annual income (in US$)	31,983	74,732	32,589	69,765	30,092	68,847	30,639	64,414
Upper secondary training	0.31	0.46	0.31	0.46	0.31	0.46	0.32	0.47
Tertiary education	0.21	0.41	0.21	0.41	0.22	0.41	0.21	0.41
Lives in couple	0.79	0.4	0.79	0.41	0.67	0.47	0.66	0.47
Any weekly contact with children	0.94	0.23	0.94	0.24	0.94	0.24	0.94	0.24
Poor self-rated health	0.35	0.48	0.35	0.48	0.35	0.48	0.35	0.48
1 chronic disease	0.28	0.45	0.28	0.45	0.28	0.45	0.28	0.45
2 chronic diseases	0.24	0.42	0.23	0.42	0.24	0.42	0.23	0.42
3+ chronic diseases	0.28	0.45	0.28	0.45	0.29	0.45	0.29	0.45
Depression	0.37	0.48	0.37	0.48	0.38	0.48	0.38	0.48
Prefrail	0.45	0.5	0.45	0.5	0.46	0.5	0.46	0.5
Frail	0.14	0.35	0.14	0.35	0.15	0.35	0.15	0.35
1 ADL limitation	0.05	0.23	0.06	0.23	0.06	0.23	0.06	0.23
2+ ADL limitations	0.04	0.21	0.04	0.2	0.04	0.2	0.04	0.2
1 IADL limitation	0.07	0.26	0.07	0.26	0.07	0.26	0.07	0.26
2+ IADL limitations	0.05	0.21	0.04	0.2	0.04	0.2	0.04	0.2
Ever smoked	0.47	0.5	0.47	0.5	0.48	0.5	0.48	0.5
Lives in a rural area	0.28	0.45	0.29	0.46	0.28	0.45	0.29	0.45
Observations	75,296		93,262		46,434		57,644	

Note: SD: standard deviation; ADL: activities of daily living, IADL: instrumental activities of daily living, Total paid leave weeks is the total weeks of paid maternity, parental and home care payments available to mothers.

4. Results

4.1. Descriptive statistics

Table 1 shows that less than 10 percent of the sample reports using paid home care (Panel A), while 0.1 percent of the sample reports living in a nursing home (Panel B). In both samples, the respondents display an average of 3.6 grandchildren (standard error: 3.4). The mean age of respondents is 69 years, and 52 percent of respondents are women, 48 percent have less than upper secondary education, 79 percent declare living in couples, and 94 percent have weekly contact with their children. More than one-third of the respondents (35 percent) report being in poor health, 28 percent have more than three chronic conditions, 37 percent experience depression, 45 percent are prefrail, 14 percent are frail, 4 percent report facing difficulties with two or more ADLs, and five percent report facing difficulties with two or more IADL. Finally, 28 percent of respondents report living in a rural area.

Table 2 also shows similarities between Panels C and D, which are subsamples of Panels A and B, respectively. Although there are slight differences between Panels A and C, and between Panels B and D, these differences are very small, suggesting that our analysis of subsamples of respondents with children may not have introduced important selection issues.

4.2. Impact of grandchildren on formal care use (Panel A)

Table 2 shows the results of the naive or OLS specification (Model 1: non-instrumented) as well as the IV or instrumented regression specification (Models 2 and 3: 2nd stage of the IV regression). Our IV estimates in Model 2 show that an additional grandchild increases the probability of using home care. On average, each additional grandchild increases the probability of using home care by 2.6 percentage points (pp, robust standard error (RSE): 0.007). Note that the effect is negative but not significant in the non-instrumented model, confirming the presence of confounders such as social norms that require dealing with the endogeneity of this variable. The direction of this effect suggests that the presence of additional grandchildren on net leads grandparents to stay at home, with formal home care, despite this meaning that parents must balance time allocation between their children and their own parents.

Adding more control variables reduces the size of the coefficient estimated in Model 2 (1.3 pp vs. 2.6 pp). Table A1 in appendix shows the detailed results of the control variables. Age continues to exert a nonlinear (inverted U-shaped) and significant effect on the use of home care. Compared to men, women have a greater probability of using home

Table 2
Impact of the number of grandchildren on grandparents' probability of using home care, results of the linear probability models.

Variable	Model 1: Naive regression with no control variables	Model 2: Instrumented regression parcimonious	Model 3: Instrumented regression all controls
Number of grandchildren	−0.001	0.026***	0.013***
	(0.000)	(0.007)	(0.003)
Year fixed-effect	Yes	Yes	Yes
Country fixed-effect	Yes	Yes	Yes
Observations	75,296	75,296	75,296

Note: *p < 0.05, **p < 0.01, ***p < 0.001, robust standard errors are in parentheses, results obtained from random-effects generalized least squares regressions (Model 1) and from the second stage of a random-effects generalized 2-stage least squares regression (Model 2 and 3). The parcimonious model controls for age, age squared and gender. In addition, the model with all controls includes: presence of a living partner (no vs. yes), income (log transformed), education level (less than upper secondary education vs. upper secondary and vocational training; less than upper secondary education vs. tertiary education), frailty status (robust vs. prefrail; robust vs. frail), number of activities of daily living (0 ADL vs. 1; 0 ADL vs. 2+), number of instrumental activities of daily living (0 IADL vs. 1; 0 IADL vs. 2+), presence of comorbidities (none vs. 1, none vs. 2, none vs. 3+), good vs. poor self-reported health, rural vs. urban living.

care (2 pp difference, RSE: 0.003). Higher income and education levels are associated with a greater use of home care, again given their reduced reliance on informal child care. However, family ties are non-negligible as respondents who live in couples and have weekly interactions with their children (exhibit stronger family ties) have a lower probability of using home care. As expected, the need of care influences the decision to use formal home care. For example, worse self-reported health, a greater number of comorbidities, and poorer functional status (frailty, difficulty with ADL and IADL) increase the probability of using home care. Finally, living in rural (vs. urban) areas is correlated with a lower use of home care (1.1 pp difference, RSE: 0.002).

Note that the results of the first stage in the IV regression (reported in Appendix, Table A4) support the strength of the instrument, which has a strong impact on the number of grandchildren (coefficient: 0.02, z-statistic = 39.25).

4.3. Impact of grandchildren on nursing home care use (Panel B)

Table 3 shows the results of the OLS or naive model (Model 4: non-instrumented) and IV model (Models 5 and 6: 2nd stage of the IV regression). Again, our results confirm the importance of instrumenting the number of grandchildren and suggest the presence of attenuation bias, namely estimates are attenuated by the presence of confounders. Although Model 4 (un-instrumented) would suggest the absence of a significant effect, Models 5 and 6 show that having one additional grandchild reduces the probability of living in a nursing home by 0.1 pp (RSE: 0.0005 in Model 5, RSE: 0.0003 in Model 6). For individuals with the same need of care, the provision of care to a grandchild reduces (either delays or avoids altogether) transfer to a nursing home.

Table A2 in appendix provides the detailed results for the control variables. Poorer functional status is a strong predictor of the probability of living in a nursing home as expected given the literature. Compared to people with no ADL, people facing 2+ ADL limitation have a 0.4 pp greater probability of living in a nursing home (RSE: 0.0011). Similarly, people facing 2+ IADL limitations have a 0.3 pp greater probability of living in a nursing home (RSE: 0.0011).

4.4. Robustness checks

4.4.1. Effect of the number of grandchildren per child (Panels C and D)

Table 4 shows the IV estimates for the impact of the ratio of grandchildren/children on the use of home care (Models 7 and 8), and on the probability of living in a nursing home (Models 9 and 10), among subsamples of respondents with children. In all Models, we find that the ratio of grandchildren to children has a significant effect on LTC decisions: an increase in the ratio of grandchildren per child increases the probability of using paid home care by 4.7 pp in Model 7 (RSE: 0.0140) and 3.6 pp in Model 8 (RSE: 0.0093), and reduces the probability of living in a nursing home by 0.17 pp in both Models 9 and 10 (RSE: 0.0011 and 0.0009, respectively). Note however, that the effect is not statistically significant in Model 9. The effects of control variables are similar to the effects observed in prior regressions (see Table A5 in appendix).

4.4.2. Sample of parents (2nd generation) who ever worked (Panel E)

Table 5 shows the results obtained when we restrict our analyses to a subsample of grandparents whose children worked at some point (full time or partly). We find that the IV remained strong within that subsample. In Model 11, we find that the results regarding the effect of the number of grandchildren on grandparents' use of home care remains the same (coefficient = 0.013) and that the correlation remains significant at the 1% level. In Model 12, we see that the effect of the number of grandchildren loses it statistical significance.

5. Discussion

The presence of grandchildren can modify incentives to parents to provide care for aging grandparents, keeping these grandparents out of nursing homes. We provide new evidence on the influence of intrafamily reciprocity resulting from the presence of grandchildren by shifting LTC use decisions. We find two sets of results. First, exploiting variation from maternity leaves, we show that having an additional grandchild both significantly increases the probability that grandparents use paid home care, and significantly reduces the probability of living in a nursing home. Second, among elderly with grandchildren, a greater number of grandchildren per adult child (generation 2) significantly increases the probability of using home care, and reduces the probability of living in a nursing home. Our results can be interpreted as causal estimates, at least among the sample of individuals that have ever worked and hence are sensitive to changes in fertility incentives resulting from the introduction of maternity leave policies (Malkova, 2018). Our results also show that these effects are increased by the ratio of grandchildren to children, suggesting that our findings tend to be amplified by family size.

Our interpretation of these findings is that policies providing more generous parental leave plans to the "sandwich generation" increase incentives to have more children, which implies more work to take care of these children, and less effort allocated to grandparents for informal home care and greater use of formal home care for them. However, grandparents may, in turn, provide child care to grandchildren and additional social ties, which create incentives for them to remain in the home; incentives that outweigh any additional time demands placed on adult children to care for their aging parents.

The fact that the number of grandchildren reduces grandparents' risks of living in a nursing home shows that nursing home use decisions and home care use decisions are taken through different mechanisms. Families with a greater number of grandchildren may find different living arrangements, involving, for instance, the cohabitation of grandparents and grandchildren, which could delay nursing home admissions. Moreover, although empirical evidence shows that social interactions are one of the main predictors of frailty among European

Table 3
Impact of the number of grandchildren on grandparents' probability of living in a nursing home, results of the linear probability models.

Variable	Model 4: Naive regression with no control variables	Model 5: Instrumented regression parcimonious	Model 6: Instrumented regression with all controls
Number of grandchildren	−0.000	−0.001*	−0.001*
	(0.0001)	(0.0005)	(0.0003)
Year fixed-effect	Yes	Yes	Yes
Country fixed-effect	Yes	Yes	Yes
Observations	93,262	93,262	93,262

Note: *p < 0.05, **p < 0.01, ***p < 0.001, robust standard errors are in parentheses, results obtained from random-effects generalized least squares regressions (Model 4) and from the second stage of a random-effects generalized 2-stage least squares regression (Models 5 and 6). The parcimonious model controls for age, age squared and gender. In addition, the model with all controls includes: presence of a living partner (no vs. yes), income (log transformed), education level (less than upper secondary education vs. upper secondary and vocational training; less than upper secondary education vs. tertiary education), frailty status (robust vs. prefrail; robust vs. frail), number of activities of daily living (0 ADL vs. 1; 0 ADL vs. 2+), number of instrumental activities of daily living (0 IADL vs. 1; 0 IADL vs. 2+), presence of comorbidities (none vs. 1, none vs. 2, none vs. 3+), good vs. poor self-reported health, rural vs. urban living.

Table 4
Impact of the number of grandchildren per child on the probability of using long-term care.

Variables	Model 7: Use of home care, parcimonious	Model 8: Use of home care, with all controls	Model 9: Live in a nursing home, parcimonious	Model 10: Live in a nursing home, with all controls
Ratio of grandchildren per child	0.0471***	0.0357***	−0.0017	−0.0017*
	(0.0140)	(0.00930)	(0.0011)	(0.0009)
Year fixed-effect	Yes	Yes	Yes	Yes
Country fixed-effect	Yes	Yes	Yes	Yes
Observations	46,434	46,434	57,644	57,644

Note: *p < 0.05, **p < 0.01, ***p < 0.001, robust standard errors are in parentheses, results obtained from the second stage of a random-effects generalized 2-stage least squares regressions. The parcimonious model controls for age, age squared and gender. In addition, the model with all controls includes: presence of a living partner (no vs. yes), income (log transformed), education level (less than upper secondary education vs. upper secondary and vocational training; less than upper secondary education vs. tertiary education), frailty status (robust vs. prefrail; robust vs. frail), number of activities of daily living (0 ADL vs. 1; 0 ADL vs. 2+), number of instrumental activities of daily living (0 IADL vs. 1; 0 IADL vs. 2+), presence of comorbidities (none vs. 1, none vs. 2, none vs. 3+), good vs. poor self-reported health, rural vs. urban living.

Table 5
Impact on parents who worked at some point of their life (Panel E).

Variables	Model 11: Use of home care	Model 12: Live in a nursing home
Number of grandchildren	0.013***	0.0000308
	(0.004)	(0.0000233)
Year fixed-effect	Yes	Yes
Country fixed-effect	Yes	Yes
Observations	38,201	38,125

Note: *p < 0.1, **p < 0.05, ***p < 0.01, robust standard errors are in parentheses, results obtained from second stage of a random-effects generalized 2-stage least squares regression. Both models control for age, age squared, sex, the presence of a living partner (no vs. yes), income (log transformed), education level (less than upper secondary education vs. upper secondary and vocational training; less than upper secondary education vs. tertiary education), frailty status (robust vs. prefrail; robust vs. frail), number of activities of daily living (0 ADL vs. 1; 0 ADL vs. 2+), number of instrumental activities of daily living (0 IADL vs. 1; 0 IADL vs. 2+), presence of comorbidities (none vs. 1, none vs. 2, none vs. 3+), good vs. poor self-reported health, rural vs. urban living.

older adults (Sirven et al., 2020), it may be greater in large families, reducing the risk of nursing home admission.

Our article has several limitations. First, we were not able to include all European countries present in the SHARE data because of missing information regarding family policies. It would have been useful to explore our research question in countries like the Czech Republic, Poland, Ireland, Portugal, Slovenia, Estonia, and Croatia, as these countries heavily rely on informal care provision (OECD, 2020). Second, the LTC use variables in the SHARE data are self-reported, which reduces the precision of our findings. An alternative to our approach would have been to use claims data, measuring for instance the duration of LTC services use. Note that as a "placebo check", we tested the impact of the number of grandchildren (instrumented with our IV) on the risks of hospitalization. We did not find any significant effect, confirming that our findings capture LTC use mechanisms (coefficient for the variable was 0.00262, and the robust standard error was 0.00317). Third, a very small proportion of our sample (both in Panels C and D) lived in a nursing home (less than 1% of the sample reports living in a nursing home), which reduced the strength of our findings. Further work will have to replicate our analyses in different samples, composed of frailer older adults, or in surveys linked with administrative claims, such as for instance the U.S.-based Health and Retirement Study linked with Medicare claims data. Finally, one could argue that coresidence can be an important driver of the correlation between the number of grandchildren and formal care use. Indeed, it is possible that larger family sizes induced by maternity leave policies would be more likely to have grandparents coresiding with their children, which would influence the use of formal care. In our sample, around 15% of respondents declare coresiding with one of their children. To explore that issue, we ran new regressions excluding co-resident parents from the sample. The effect of the number of grandchildren was the same (2.6 pp increase in formal care associated with an additional grandchildren), showing that coresidence did not drive our findings. Note however, that even after excluding coresidents, our results are indeed driven by grandparents and parents living closely, which explains informal care, regardless of the number of grandchildren. However, restricting the sample by residential mobility is potentially problematic as residential choice is endogenous (e.g., parents/children change residence with needs), it would therefore be a bad control, likely to overestimate the effect size. Finally, another potential alternative mechanism to explain our results may relate to women's labor market outcomes, and related family economic outcomes resulting from maternity leave policies. Indeed, one could assume that the increased use of formal care among grandparents is explained by the fact that because maternity leave policies, women have a greater chance of remaining in the labor market and experience more successful career paths. This could involve less informal care provision provided by the children (second generation) due to for instance to greater work-related geographical mobility. This alternative mechanism, which does not operate via fertility/additional grandchildren, may imply a violation of the exclusion restriction assumption.

Our results have important policy implications. There is a growing concern regarding the supply of informal elder care in many countries, because of increased participation of women in the labor market, greater household mobility, and new family structures (OECD, 2020). Since 2010, many countries have introduced several new ways of enhancing the supply of non-paid family caregivers such as paid leave, training and certification of caring skills, access to short-term respite care for the disabled elderly, and intergenerational home sharing platforms etc. (OECD, 2020). Our results suggest that the impact of these measures may be indirectly attenuated by family policies targeting infants' decades earlier. This reveals unexpected competition between traditional family policies that are often directed towards the support of young people and new LTC policies that are introduced to support families with aging members.

In conclusion, this article identifies a new dilemma for family policies across the World. Increasing the generosity of child policies could ultimately increase LTC spending needs to support greater use of paid home care among older people with LTC needs. Our results provide a new perspective to family policies, which now have to increasingly consider the LTC needs of older adults. They show that more than ever, LTC policies should not be conceived as policies for older people, as they are interconnected with other policy domains, including for instance family and labor policies.

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manuscript.

Data availability

We used data from the Survey of Health, Ageing and Retirement in Europe, which are publicly available.

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Appendix. 8

Table A1
Impact of the number of grandchildren on grandparents' probability of using home care – Results of the linear probability models (Panel A)

Variables	Model 1: Naive regression	Model 3: Instrumented regression
Number of grandchildren	−0.001	0.013***
	(0.000)	(0.003)
Age	−0.045***	−0.052***
	(0.003)	(0.004)
Age squared	0.000***	0.000***
	(0.000)	(0.000)
Female	0.025***	0.020***
	(0.002)	(0.003)
Annual Income (logged)	0.002***	0.003***
	(0.001)	(0.001)
Upper secondary and vocational training	0.020***	0.029***
	(0.003)	(0.003)
Tertiary education	0.028***	0.039***
	(0.003)	(0.004)
Lives in couple	−0.055***	−0.058***
	(0.003)	(0.003)
Any weekly contact with children	−0.007	−0.013***
	(0.005)	(0.005)
Poor self-rated health	0.026***	0.027***
	(0.003)	(0.003)
1 chronic disease	0.004	0.003
	(0.002)	(0.002)
2 chronic diseases	0.008***	0.007***
	(0.003)	(0.003)
3+ chronic diseases	0.021***	0.018***
	(0.003)	(0.003)
Depression	0.009***	0.009***
	(0.002)	(0.002)
Prefrail	0.015***	0.014***
	(0.002)	(0.002)
Frail	0.067***	0.064***
	(0.005)	(0.005)
1 activities of daily living limitation	0.064***	0.065***
	(0.006)	(0.006)
2+ activities of daily living limitations	0.184***	0.185***
	(0.010)	(0.010)
1 instrumental ADL	0.051***	0.047***
	(0.005)	(0.005)
2+ instrumental ADL	0.177***	0.168***
	(0.010)	(0.010)
Ever smoked	0.004*	0.004
	(0.002)	(0.002)
Lives in a rural area	−0.007***	−0.011***
	(0.002)	(0.002)
Constant	1.403***	1.672***
	(0.118)	(0.132)
Year fixed-effect	Yes	Yes
Country fixed-effect	Yes	Yes
Observations	75,296	75,296

Note: *p < 0.1, **p < 0.05, ***p < 0.01, robust standard errors are in parentheses, results obtained from random-effects generalized least squares regressions (Model 1) and from the second stage of a random-effects generalized 2-stage least squares regression (Model 2). F-Statistic for the instrument in Model 2 is 1168.352.

Table A2
Impact of the number of grandchildren on grandparents' probability of living in a nursing home – Results of the linear probability models (Panel B)

Variables	Model 4: Naive regression	Model 6: Instrumented regression
Number of grandchildren	−0.00001	−0.001**
	(0.0001)	(0.0003)
Age	−0.001	−0.000
	(0.0005)	(0.0005)
Age squared	0.000	0.000
	(0.0000)	(0.0000)
Female	0.0001	0.0001
	(0.0003)	(0.0003)
Annual Income (logged)	−0.0002*	−0.0002*
	(0.0001)	(0.0001)
Upper secondary and vocational training	0.001*	0.000
	(0.0004)	(0.0004)
Tertiary education	−0.000	−0.001
	(0.0003)	(0.0004)
Lives in couple	−0.001**	−0.001
	(0.0004)	(0.0004)
Any weekly contact with children	−0.000	0.000
	(0.0005)	(0.0005)
Poor self-rated health	0.000	0.000
	(0.0003)	(0.0003)
1 chronic disease	0.000	0.000
	(0.0003)	(0.0003)
2 chronic diseases	0.000	0.000
	(0.0004)	(0.0004)
3+ chronic diseases	0.000	0.000
	(0.0004)	(0.0004)
Depression	−0.000	−0.000
	(0.0003)	(0.0003)
Prefrail	−0.000	−0.000
	(0.0003)	(0.0003)
Frail	−0.001	−0.001
	(0.0006)	(0.0006)
1 activities of daily living limitation	0.000	0.000
	(0.0006)	(0.0005)
2+ activities of daily living limitations	0.003***	0.004***
	(0.0011)	(0.0011)
1 instrumental ADL	0.000	0.000
	(0.0006)	(0.0006)
2+ instrumental ADL	0.003***	0.003***
	(0.0010)	(0.0011)
Ever smoked	0.000	0.000
	(0.0003)	(0.0003)
Lives in a rural area	−0.000	0.000
	(0.0003)	(0.0003)
Constant	0.024	0.013
	(0.0185)	(0.0191)
Year fixed-effect	Yes	Yes
Country fixed-effect	Yes	Yes
Observations	93,262	93,262

Note: *p < 0.1, **p < 0.05, ***p < 0.01, robust standard errors are in parentheses, results obtained from random-effects generalized least squares regressions (Model 3) and from the second stage of a random-effects generalized 2-stage least squares regression (Model 4). F-Statistic for the instrument in Model 4 is 1513.037.

Table A3
Impact of the number of grandchildren per child on the probability of using long-term care – Results of the 2nd stage of the random-effects generalized 2-stage least squares regressions

Variables	Model 8: Use of home care (Panel C)	Model 10: Live in a nursing home (Panel D)
Ratio of grandchildren per child	0.0357***	−0.0017*
	(0.00930)	(0.0009)
Age	−0.0517***	−0.0005
	(0.00523)	(0.0008)
Age squared	0.000394***	0.000004
	(0.0000363)	(0.000006)
Female	0.0138***	0.0005
	(0.00345)	(0.0004)
Annual Income (logged)	0.00224***	−0.0003*
	(0.000867)	(0.0002)
Upper secondary and vocational training	0.0255***	0.0003
	(0.00375)	(0.0005)
Tertiary education	0.0355***	−0.0004

(*continued on next page*)

Table A3 (*continued*)

Variables	Model 8: Use of home care (Panel C)	Model 10: Live in a nursing home (Panel D)
	(0.00435)	(0.0004)
Lives in couple	−0.0538***	−0.0003
	(0.00377)	(0.0004)
Any weekly contact with children	−0.00574	−0.0004
	(0.00593)	(0.0007)
Poor self-rated health	0.0306***	0.0005
	(0.00352)	(0.0004)
1 chronic disease	0.00390	0.0004
	(0.00307)	(0.0004)
2 chronic diseases	0.00853**	0.0003
	(0.00359)	(0.0005)
3+ chronic diseases	0.0186***	0.0002
	(0.00416)	(0.0005)
Depression	0.00642**	0.0000
	(0.00320)	(0.0004)
Prefrail	0.0218***	−0.0006
	(0.00251)	(0.0004)
Frail	0.0761***	−0.0016*
	(0.00631)	(0.0008)
1 activities of daily living limitation	0.0678***	0.0011
	(0.00799)	(0.0008)
2+ activities of daily living limitations	0.181***	0.0044***
	(0.0126)	(0.0016)
1 instrumental ADL	0.0565***	0.0002
	(0.00679)	(0.0007)
2+ instrumental ADL	0.179***	0.0033**
	(0.0128)	(0.0016)
Ever smoked	0.00470	0.0003
	(0.00289)	(0.0004)
Lives in a rural area	−0.00897***	−0.0002
	(0.00309)	(0.0004)
Constant	1.627***	0.0208
	(0.183)	(0.0282)
Year fixed-effect	Yes	Yes
Country fixed-effect	Yes	Yes
Observations	46,434	57,644

Note: *p < 0.1, **p < 0.05, ***p < 0.01, robust standard errors are in parentheses, results obtained from the second stage of a random-effects generalized 2-stage least squares regressions. F-stats for the IV in Models 5 and 6 are respectively: 1221.295 and 1797.047.

Table A4
Impact of maternal leave generosity on the number of grandchildren - Results of the first stage of the random-effects generalized 2-stage least squares regressions

Variable	First stage for Model 2 (Panel A)			First stage for Model 4 (Panel B)		
	Coef.	RSE	z-stat	Coef.	RSE	z-stat
Total paid leave weeks	**0.02**	**0.001**	**39.25**	**0.021**	**0.0004**	**47.76**
Age	0.529	0.032	16.61	0.517	0.0287	17.98
Age squared	−0.003	0.0001	12.68	−0.003	0.0002	13.55
Female	0.352	0.025	14.14	0.367	0.0222	16.53
Annual Income (logged)	−0.039	0.008	5.18	−0.051	0.0071	7.17
Upper secondary training	−0.742	0.03	24.81	−0.718	0.0265	27.04
Tertiary education	−0.829	0.033	24.86	−0.796	0.03	26.58
Lives in couple	0.225	0.03	7.43	0.215	0.027	7.97
Any weekly contact	0.507	0.042	11.97	0.529	0.037	14.29
Poor self-rated health	−0.077	0.026	2.96	−0.078	0.0233	−3.34
1 chronic disease	0.076	0.029	2.65	0.072	0.0257	2.81
2 chronic diseases	0.089	0.032	2.78	0.084	0.0284	2.96
3+ chronic diseases	0.219	0.035	6.27	0.206	0.0311	6.64
Depression	0.02	0.024	0.84	0.019	0.0216	0.9
Prefrail	0.099	0.023	4.28	0.086	0.0206	4.16
Frail	0.216	0.043	5.04	0.171	0.0384	4.45
1 ADL limitation	−0.064	0.049	1.30	−0.07	0.0439	1.6
2+ ADL limitations	−0.108	0.075	1.44	−0.081	0.0668	1.21
1 IADL limitation	0.294	0.047	6.26	0.278	0.0418	6.65
2+ IADL limitations	0.655	0.082	8.04	0.601	0.0731	8.22
Ever smoked	0.01	0.024	0.42	0.001	0.0213	0.05
Lives in a rural area	0.34	0.024	13.92	0.36	0.0218	16.55
Constant	−21.25	1.116	19.03	−20.69	1.008	20.52
Year fixed-effect	Yes			Yes		
Country fixed-effect	Yes			Yes		
Observations	75,296			93,262		

Note: RSE: robust standard error ADL: activities of daily living, IADL: instrumental activities of daily living, Total paid leave weeks is the total weeks of paid maternity, parental and home care payments available to mothers.

Table A5
Impact of maternal leave generosity on the ratio of grandchildren per child- Results of the first stage of the random-effects generalized 2-stage least squares regressions

Variable	First stage for Model 5 (Panel C)			First stage for Model 6 (Panel D)		
	Coef.	RSE	z-stat	Coef.	RSE	z-stat
Total paid leave weeks	**0.0079**	**0.0002**	**49.01**	**0.0079**	**0.0002**	**40.8**
Age	−0.0014	0.0001	12.54	0.2367	0.0179	13.22
Age squared	0.1668	0.0095	17.52	−0.0014	0.0001	10.97
Female	−0.0044	0.0032	1.38	0.1648	0.0106	15.51
Annual Income (logged)	−0.0044	0.0032	1.38	−0.0001	0.0029	0.05
Upper secondary training	−0.1132	0.0109	10.38	−0.1065	0.0123	8.65
Tertiary education	−0.1765	0.0122	14.44	−0.1777	0.0134	13.22
Lives in couple	0.0987	0.0096	10.31	0.096	0.0105	9.1
Any weekly contact with children	−0.008	0.0194	0.41	−0.0151	0.0223	0.68
Poor self-rated health	−0.0092	0.0095	0.97	−0.01	0.0108	0.93
1 chronic disease	0.0472	0.0114	4.13	0.0469	0.0129	3.63
2 chronic diseases	0.0514	0.0123	4.18	0.0465	0.0137	3.39
3+ chronic diseases	0.0851	0.0129	6.59	0.0808	0.0145	5.58
Depression	0.0264	0.0091	2.9	0.0275	0.0102	2.69
Prefrail	0.001	0.009	0.11	0.011	0.01	1.1
Frail	0.0107	0.0153	0.7	0.0286	0.017	1.68
1 ADL limitation	−0.0116	0.0183	0.63	−0.0073	0.0206	0.36
2+ ADL limitations	−0.0042	0.0245	0.17	−0.0063	0.0282	0.22
1 IADL limitation	0.0281	0.0156	1.81	0.0384	0.0176	2.18
2+ IADL limitations	0.0165	0.0253	0.65	0.0231	0.0283	0.81
Ever smoked	0.0138	0.009	1.53	0.0218	0.0101	2.15
Lives in a rural area	0.0704	0.0091	7.76	0.0739	0.0102	7.25
Constant	−8.8435	0.5339	16.57	−9.1748	0.6264	14.65
Year fixed-effect	Yes			Yes		
Country fixed-effect	Yes			Yes		
Observations	57,644			46,434		

Note: RSE: robust standard error ADL: activities of daily living, IADL: instrumental activities of daily living, Total paid leave weeks is the total weeks of paid maternity, parental and home care payments available to mothers.

Table A6
Correlation between long-term care spending and our instrument

Variables	Total real LTC spending in US$ (log-transformed)
Total paid leave for mothers (in US$)	0.00280
	(0.00182)
% of population over 65 years old	0.248*
	(0.122)
Growth domestic product	0.0000188***
	(0.00000191)
Total number of death age group 65-74	0.0000171
	(0.0000613)
Total number of death age group 75+	9.32e-08
	(0.00000473)
Constant	−0.618
	(3.233)
Observations	32

Note: *p < 0.05, **p < 0.01, ***p < 0.001, robust standard errors are in parentheses, results obtained from fixed effect regressions.

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