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Grandchild care and eldercare. A quid pro quo arrangement*

Mathieu Lefebvre[†], Pierre Pestieau[‡], Jérôme Schoenmaeckers[§]

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Abstract

The phenomenon of grandparents assuming the role of caretakers for their grandchildren is both substantial and on the rise, a trend partially attributed to mothers' increasing participation in the workforce. While altruism is commonly believed to be the primary driver behind such caregiving, we propose to examine an additional motivation: the expectation among grandparents that they will receive care from their offspring in the event of their own incapacity. This paper aims to investigate this hypothesis from both theoretical and empirical perspectives. Initially, we construct a theoretical framework, delineating a Subgame Perfect Nash Equilibrium, wherein the grandparent first commits to caring for the grandchild, followed by the anticipation of receiving care from their adult child in scenarios of disability. Subsequently, we empirically test the feasibility of this model by analyzing data sourced from the Survey of Health, Ageing and Retirement in Europe (SHARE). Our results confirm that elderly who took care of their grandchildren receive more support from their children in the case of a loss of autonomy.

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[†]University of Strasbourg, BETA, CNRS, Strasbourg, France, mathieu.lefebvre@unistra.fr

[‡]University of Liège, CORE and TSE, Belgium, ppestieau@uliege.be

[§]Corresponding author: University of Liège, Belgium, jerome.schoenmaeckers@uliege.be

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1 Introduction

The phenomenon of intergenerational caregiving, where elderly individuals initially provide care for their grandchildren before eventually receiving care from their own children, illustrates complex familial dynamics and shifting societal norms. There is large evidence that grandparents contribute actively to child care¹. According to Hank and Buber (2009), about half of European grandparents are involved in childcare (Hank and Buber, 2009), though with heterogeneity among countries. Also, the vast majority of elderly people who need assistance receive their care exclusively from their family caregivers, mostly wives and daughters (Cremer et al., 2012). This cycle of care reflects broader demographic, economic, and health trends globally, encompassing social support, role reversals, and evolving familial responsibilities. Advances in healthcare have extended life expectancies, allowing grandparents to maintain active roles in their grandchildren's lives for longer periods. This extended interaction enhances intergenerational bonding and offers mutual benefits. On the one hand, economic necessities, such as dual-income households and rising childcare costs, often compel grandparents to assume childcare responsibilities. On the other hand, this not only provides economic relief but also strengthens emotional ties across generations.

Culturally, this reciprocal care is embedded in many societies, where caregiving is a respected duty that reinforces familial bonds. However, caregiving's impact on elderly individuals can be dual-faceted. Engaging with grandchildren can offer physical, cognitive, and social benefits, yet the demands of caregiving may pose health risks, particularly for those with limited physical abilities or preexisting conditions. Eventually, the caregiving role may reverse, with adult children assuming greater re-

¹See Zanasi et al. (2023) for a survey of studies.

sponsibilities for their aging parents. This shift can challenge the independence and dignity of the elderly, requiring adjustments in family dynamics and mutual support strategies. The caregiving cycle among grandparents, grandchildren, and adult children highlights significant societal issues like demographic shifts and economic strains. It underscores the importance of robust family support systems and the need for policies that address the intricate needs of multi-generational families.

In this paper, we explore these dynamics using a game-theoretic approach as well as the Survey of Health, Ageing and Retirement in Europe (SHARE) data to test hypotheses and understand the underlying motives and implications of such caregiving arrangements. To do so, we start by sketching a simple model of intergenerational care provision within a family consisting of three generations, which results into testable hypotheses regarding caring between generations. Then, we use the SHARE information regarding the effect of childcare given by grandparents on the likelihood to receive help by children as well as the total time given by these children.

An important literature has been dedicated to the understanding of the motives for caring. Different family transfer models have been proposed and tested empirically. Klimaviciute and Pestieau (2023) point out three main types of motivations that are most often discussed in the literature. The standard motive is altruism (Becker, 1974). Individuals would help their family member out of concern for the well-being of their relatives without any expectations of reward. Altruism would lead parents to provide more to their less well-off children and would imply children to take care of their dependent parents, regardless of required time. However altruism is not the only possible motive for caring and the solidarity between generations is also often based on social (family) norms or strategic considerations. Family norms would operate as invisible constraints on family members' behavior including taking care of children and dependent parents (Canta and Pestieau, 2013). A strand of the literature also stresses the importance of the exchange motive that involves

taking actions to help others with the expectation that they will offer help in return (Bernheim et al., 1985; Cox, 1987; Cigno, 1993; Cigno et al., 1998).

Several studies have examined empirically the motivations for caring within the family². Most reject the altruistic motivations (see e.g Cigno et al., 1998; McGarry, 2000). However these studies often look at money transfers and not time dedicated to care family members. Some works have tried to discriminate between the altruistic and exchange motive by looking also at time transfers from children to parents (Schoeni, 1997; Altonji et al., 2000; Sloan et al., 2002; Alessie et al., 2014). The results are mixed while some find no evidence in favor of an exchange motive, Alessie et al. (2014) find that exchange motives might (partly) explain transfers between family members. Finally, Klimaviciute et al. (2017) have looked at three main motives together and show that the role of norms is far from being negligible. None of these previous studies look at the caregiving cycle among grandparents, grandchildren, and adult children except Brugiavini et al. (2013) who found a positive relationship on other SHARE survey waves, but without controlling for the dependence between adult children characteristics and decisions. Though it highlights significant societal issues like demographic shifts and economic strains and it underscores the importance of robust family support systems and the need for policies that address the intricate needs of multi-generational families.

The contribution of our paper is thus twofold. First, we construct a theoretical framework, delineating a Subgame Perfect Nash Equilibrium, wherein the grandparent first commits to caring for the grandchild, followed by the anticipation of receiving care from their adult child in the case of dependence. The model yields predictions on both the decision to care by grandparents and the probability to receive help from the adult children once long term care is needed, conditional on having taking care of the grandchildren. Second, we use the SHARE information regarding the effect

²See Wolff and Laferrere (2006) and Klimaviciute et al. (2017) for a review of literature.

grandparents care of grandchildren on the level of care received from the adult children in the case of dependence. By using the detailed information from SHARE, one can relate each older individual to the help given and received from each of the adult children.

Our results show a positive and significant effect of having taken care of grandchildren on the likelihood to receive help from adult children. This result is robust to various specification and estimation models. Looking at heterogeneity, we observe that this positive effect is driven by countries from Southern Europe where the institutions and the family norms are more in favor of the family as a main caregiver. We also find some substitutability within the family with a lower probability of being helped by the adult children where the older dependent still has a partner.

The paper is structured as follows. Section 2 presents the theoretical models. Section 3 focuses on the presentation of data and sample construction. Some descriptive statistics about both types of cares are presented. The estimation results are reported in Section 4. Section 5 concludes.

2 Theoretical model

We consider two periods and a family consisting of three generations, say the grandparent, the parent (adult child) and the grandchild. During the first period, the grandparent is ready to devote part of her leisure time to take care of the grandchild with the expectation that in case of needs in the second period her own child will help her. Indeed the need for long term care may happen with probability π .

In the first period, the parent works and the grandchild receives some attention e from the still healthy grandparent and f from the parent. The grandparent benefits from a pension p and enjoys leisure $1 - e$ but buys an actuarially fair long-term care insurance with premium φ . The grandparent first period utility is given by a quasi-

concave utility function $h(p-\varphi, 1-e)$. The parent consumes an income $w(1-f)$ where w is the wage rate. In the second period, if the grandparent becomes dependent, she needs special care m that consists of formal long-term care $\frac{\varphi}{\pi}$ and informal care a provided by the parent. In that case, the parent earns $(1-a)w$.

In this setting, both the parent and the grandparent are altruistic and concerned by the utility of the grandchild expressed by $\alpha v(e+f)$, where α measures the intensity of altruism which is supposed to be the same for parent and grandparent. The utility of the grandparent is given by:

$$U_{gp} = h(p - \varphi, 1 - e) + \alpha v(f + e) + \beta \left[(1 - \pi)u(p) + \pi H\left(a + \frac{\varphi}{\pi}\right) \right]$$

where β is the time preference factor and the utility functions $v(\cdot)$, $u(\cdot)$, $H(\cdot)$ are strictly concave. The utility of the parent is given by:

$$U_p = u(w(1 - f)) + \alpha v(f + e) + \beta [(1 - \pi)u(w) + \pi u(w(1 - a))]$$

Note that in this specification the parent and the grandparent are linked by their altruism towards the grandchild. They do not have any altruism towards each other. We assume that the parent is a Stackelberg leader and thus we proceed in two stages backward by first looking at the utility maximization of the grandparent taking a as given and then that of the parent.

2.1 Grandparent utility maximisation

The grandparent maximizes the utility with respect to e and φ and the interior first-order conditions (FOC) are:

$$\frac{\partial U_{gp}}{\partial e} = -h_2(p - \varphi, 1 - e) + \alpha v'(f + e) = 0$$

$$\frac{\partial U_{gp}}{\partial \varphi} = -h_1(p - \varphi, 1 - e) + \beta H'(a + \frac{\varphi}{\pi}) = 0$$

where $h_1 = \frac{\partial h}{\partial e}$ and $h_2 = \frac{\partial h}{\partial \varphi}$.

Combining those two FOCs, we obtain

$$h_2\beta H' - h_1\alpha v' = 0$$

In the case of perfect substitutability between consumption and aid, this equation would reduce to $\beta H' = \alpha v'$, implying that the marginal utility of long term care and that of childcare are equal. By implicit differentiation, we obtain:

$$[-h_{22}\beta H' - \alpha v''h_1 + h_{12}v'] de + h_2\beta H'' da = 0$$

From this, we obtain the effect on e :

$$e'(a) = \frac{h_2\beta H''}{h_{22}\beta H' + \alpha v''h_1 - h_{12}v'}$$

One easily checks that a sufficient condition for $e'(a) > 0$ is $h_{12} > 0$, that is informal and formal long term care are complementary.

2.2 Parent utility maximisation

In the second stage of the game, the parent chose a and f given $e'(a)$. The FOCs are given by:

$$\frac{\partial U_p}{\partial a} = \Delta = \alpha v'(f + e)e'(a) - \beta \pi u'(w(1 - a))w = 0 \quad (1)$$

$$\frac{\partial U_p}{\partial f} = \alpha v'(f + e) - u'(w(1 - f))w = 0 \quad (2)$$

Equation 2 yields a relation between f and e ; in fact we have: $f = f(e, w, \alpha)$. We

now use equation (1) to see the expected impact of w, π, β, α on a .

2.3 Comparative statics

By implicit differentiation of (1), we obtain:

$$da [\alpha v' e''(a) + \beta \pi u'' w] - (d\beta + d\pi) u' w - \beta \pi u' dw + v' e' d\alpha = 0.$$

We can use this equation to see the effects of π, w, p, β, α on both e and a using the second-order conditions $\Delta' = \alpha v' e''(a) + \beta \pi u'' w < 0$. We thus have:

$$\begin{aligned} \frac{da}{d\beta} = \frac{da}{d\pi} = \frac{u' w}{\Delta'} < 0 \\ \frac{da}{dw} = \frac{u' \pi \beta}{\Delta'} < 0; \frac{da}{d\alpha} = \frac{v' e'}{\Delta'} > 0 \end{aligned}$$

In words, both e and a increase with the altruism parameter and decrease with the wage rate (opportunity cost), the disability probability and the time preference. The grandparent's income has no effect on either e or a . In the empirical section that follows, we specifically examine the relationship between grandchild care and elder care. We aim to explore the hypothesis that children's assistance to their disabled parents is motivated by the reciprocal care these grandparents previously provided to their grandchildren.

2.4 Interpretation

This theoretical model is deliberately kept simple. By assuming identical individuals and abstracting from the possibility of having more than one adult child or grandchild, we simplify the relationships involved. Additionally, we assume the parent acts as the Stackelberg leader, although the reverse scenario, as suggested by Pestieau and Sato (2008), is also plausible. A key feature of this model is the intro-

duction of two methods for financing the risk of dependence. The first method is the standard long-term care insurance; the second method involves a sort of premium in the first period under the form of grandchild care e that leads to an aid a in the second period. Compared to standard long-term care insurance, this family compact has both an advantage and a disadvantage. The advantage is that the grandparent derives satisfaction from providing grandchild care. The disadvantage is that this compact operates within a non-cooperative game framework. In a cooperative setting, we would have a corner solution with $a > 0$ if $w < 1$.

3 Data and sample

We use data from the Survey of Health Ageing, and Retirement in Europe (SHARE). SHARE is an international, interdisciplinary and longitudinal survey of people aged 50 and over. About 380,000 in-depth interviews with 140,000 people aged 50 or older from 28 European countries and Israel have been conducted. Every two years since 2004, the questions relate to the health status (objective and subjective) of the respondents and their potential spouses, as well as to the economic and social situation of the household, including relations with their children and close relatives.

3.1 Sample and descriptive statistics

In this paper, we use the first two waves of the survey to collect information on whether the individuals have declared at one point that they took care of their grandchildren. This corresponds to Period 1 in our theoretical framework. We then relate this information to the probability of receiving care from their children once they need long term care a few years later in the fifth wave of the survey, which is Period 2 then. We restrict our analysis to the fifth wave because it is the last wave of the survey in which we can relate each child help to past childcare by the

grandparents. Our sample is thus composed of people for whom we have information on the existence of adult children who have children of their own to test this theory of reciprocity. For the sake of data management, we restrict the sample to family with at most four children³.

Our base sample therefore consists of respondents' adult children (the parent in our theoretical framework) for whom accurate information about their gender, marital status, employment status, level of education and number of children is available. Regarding the informal support received by grandparents from their children, three people are potentially nameable by respondents. In SHARE indeed, information regarding the amount of informal care received is collected for only up to three potential informal caregivers. So, if the respondent has more than three caregivers, it is possible that our variable of informal care underestimates the amount of informal care provided by all the adult children.

The key variable in our analysis is thus whether the grandparent took care of grandchildren in the first two waves of the survey (Period 1). And we relate this variable to the probability of receiving help from their parent a few years later (Period 2) in case of need for long term care. That is we restrict our sample of analysis to individuals who present at least one limitation in activities of daily living (ADL). A person is usually considered dependent if she has two or more difficulties in performing the following daily tasks (ADLs): 1) dressing, including putting on shoes and socks; 2) walking across a room; 3) bathing or showering; 4) eating, such as cutting up your food; 5) getting in or out of bed; 6) using the toilet, including getting up or down. To increase the size of our sample, we decide to deviate a little from this threshold and to consider people with at least one limitation. In further analysis we restrain this condition to two ADLs but it does not affect our results (See Section 4.2).

³This corresponds to respectively 92.9% and 93.5% of people in the original sample of individuals of wave 1 and 2 who declare to have children.

Table 1 summarizes the main characteristics of our sample. We have 2452 parent/grandparent pairs for whom we can link the help given in period 1 and the help received in period 2 by the grandparent who has become dependent in the meantime. This corresponds to 1186 grandparents who are dependent in period 2 and who have at least one grandchild in period 1 for whom they could provide care. There are 1949 parents of these grandchildren in our sample. This means that a grandparent may appear more than once if he or she has several children who themselves have children. Similarly, a parent may appear twice if his or her parents (the grandparents) are still in couple but we observe almost none of these.

Our set of countries differ according to institutions but also probably in terms of the role of the family in the intergenerational care. Our data cover ten European countries that can be roughly divided into three groups based on their long-term care system. As explained by Kools and Knoef (2019), in the northern European countries the government is mainly responsible for organizing long term care. In the south and eastern countries, on the contrary, the family of the individual bears the main responsibility for providing care. In central countries, the responsibility for long term care is shared between the government and the family. We classify Denmark, Sweden and the Netherlands as Northern countries; Austria, Belgium, France, Germany and Switzerland as central countries and Italy and Spain as Southern countries.

In Table 1, we see that among grandparents, women are over-represented, particularly in the South, and the average age is 77.5 years. Just over 50% of grandparents still have a partner living in the same home. Without surprise, these dependent grandparents have a low assessment of their health. Looking at the sample of children, they are more often in couple in the South of Europe and we observe large differences in terms of work status and education level across regions. The average number of children of parents is close to 2⁴.

⁴30.8% have 1 child, 47.8% two and 21.4% 3 or more

Table 1: Descriptive statistics of the sample

<i>Grandparent</i>				
	North	Center	South	All
Grandchild in period 1 (%)	37.5	35.1	31.8	34.7
Female (%)	59.0	57.3	69.0	61.2
Age (mean; s.d.)	76.4	77.0	79.3	77.5
In couple (%)	54.1	54.8	51.8	53.7
Wealth (1000 euros, mean; s.d.)	200.6 (304.0)	257.3 (456.4)	231.7 (832.2)	235.0 (568.6)
Self-perceived health	Very Good / Excellent (%)			
	Less than very good (%)			
N	307	524	355	1186
<i>Parent</i>				
Grandparent care in period 2 (%)	18.9	18.5	21.2	19.4
Female (%)	52.6	51.6	51.8	51.9
In couple (%)	78.5	76.4	87.9	80.6
Number of children (mean; s.d.)	2.09 (0.84)	1.99 (0.96)	1.94 (0.93)	2.00 (0.92)
Education Level	Low - ISCED [0;2]	17.3	61.6	31.9
	Medium - ISCED [3;4]	44.5	26.3	41.2
	High - ISCED [5;6]	36.0	12.1	26.9
Work status	Full employment	73.5	68.6	70.4
	Partial employment	12.8	3.6	9.3
	Inactive (retired, health issue or personal choice)	13.7	27.8	20.3
N	529	802	618	1949

The sample without dependence condition is presented at Appendix 1. This second and larger sample on which robustness and heterogeneity tests will be also carried out comprises almost 17,000 parent/grandparent pairs. Table 1 also presents the average proportion of grandparent who took care of their grandchildren as well as average proportion of adult children who helped to parent. Table 2 summarizes this information for each country separately. No particular north-south gradient in the distribution appears, even if in the North, grandparents seem *a priori* to be more present on the extensive margin.

		Grandparent		Parent	
		Grandchild care in period 1 (%)		Grandparent care in period 2 (%)	
		Mean	s.d.	Mean	s.d.
North		37.5	(48.4)	18.9	(39.2)
	Denmark	38.9	(49.0)	25.1	(43.5)
	Netherlands	40.5	(49.4)	14.1	(34.9)
	Sweden	34.2	(47.6)	16.0	(36.7)
Center		35.1	(47.8)	18.5	(38.8)
	Austria	32.3	(47.1)	23.0	(42.3)
	Belgium	38.1	(48.7)	21.1	(40.8)
	France	34.2	(47.6)	16.5	(37.2)
	Germany	29.8	(46.0)	14.6	(35.5)
	Switzerland	40.5	(49.8)	10.9	(31.5)
South		31.8	(46.6)	21.2	(40.9)
	Italy	35.9	(48.1)	18.0	(38.5)
	Spain	28.6	(45.3)	23.5	(42.5)
All		34.7	(47.6)	19.4	(39.6)
N		1186		1949	

Table 2: Granchild care in period 1 and grandparent care in period 2 w.r.t countries

Finally, Table 3 describes our two main variables of interest according to the characteristics of grandparents and parents and by group of countries. In the first panel, we can see that the 80+ age group took the least care of their grandchildren in period 1, whereas they received the most attention in period 2. We also note that in period 1, grandparents (still) in couple were the most active in looking after grandchildren, while singles received the most help in period 2. Looking at the second part of the table, we see that Northern European women received the most help

from their parents in period 1, while Southern European women were the ones who supplied the most care to their parents in period 2.

		Grandchild care in period 1 (%)				Grandparent care in period 2 (%)			
<i>Grandparent's characteristics</i>		North	Center	South	All	North	Center	South	All
Sex	Female	36.6	32.0	27.9	31.6	19.3	20.5	21.7	20.6
	Male	33.7	30.5	29.4	31.2	14.0	10.1	14.9	12.4
Age	Less than 65	53.5	51.1	43.2	50.5	16.9	12.6	8.1	13.3
	65-80	46.6	45.3	40.6	44.5	11.0	7.0	15.9	10.5
	80+	17.2	13.7	19.7	16.8	24.0	25.7	23.0	24.3
In couple	Yes	45.2	39.9	30.0	38.4	7.6	9.1	16.5	10.9
	No	24.2	22.0	26.7	24.1	27.6	23.8	22.8	24.4
Wealth	1st tercile	27.2	25.4	25.7	26.0	19.7	14.4	19.4	17.4
	2nd tercile	47.9	33.6	30.6	36.0	13.6	21.5	21.4	19.5
	3rd tercile	44.1	43.5	31.0	39.7	12.7	13.0	17.9	14.5
<i>Parent's characteristics</i>									
Sex	Female	41.2	33.6	32.6	35.3	19.6	18.0	27.4	21.3
	Male	28.9	28.9	23.9	27.2	14.1	13.8	11.7	13.2
In couple	Yes	34.2	31.8	28.2	31.2	17.0	15.1	20.4	17.4
	No	39.2	30.4	29.5	32.8	16.8	19.4	14.8	17.7
Education level	Low	25.8	19.9	19.8	20.8	12.1	15.7	17.9	16.5
	Medium	37.2	28.4	41.3	33.5	16.2	16.8	21.2	17.6
	High	38.9	41.6	42.4	40.8	19.9	15.1	26.1	18.3
Number of children	1	31.6	32.8	32.6	32.5	12.9	14.9	14.9	14.5
	2	36.4	32.9	29.3	32.7	19.7	15.8	22.6	19.0
	3 or +	36.9	25.8	17.4	27.1	15.5	18.4	21.0	18.2
Employment status	Full time	34.5	32.2	30.1	32.2	18.1	14.2	20.7	17.3
	Part time	47.5	37.5	28.6	39.9	13.7	21.7	7.1	17.1
	Inactive	31.0	25.4	23.4	25.6	14.9	19.1	19.0	18.3
N		642	1040	770	2452	642	1040	770	2452

Table 3: Granchild care in period 1 and grandparent care in period 2 w.r.t main covariates

All this is summarized in Figure 1 and Figure 2 that present the percentages of help given by parent in period 2 based on having received help with grandchildren in the first period. We do not observe a higher percentage of conditional help everywhere. Except for the Southern European region and for single grandparents. The next section presents the empirical strategy for investigating this relationship.

3.2 Empirical Strategy

We look at the effect of taking care of grandchildren from child j on receiving help from adult child j once the grandparent i is dependent. The units of observation are

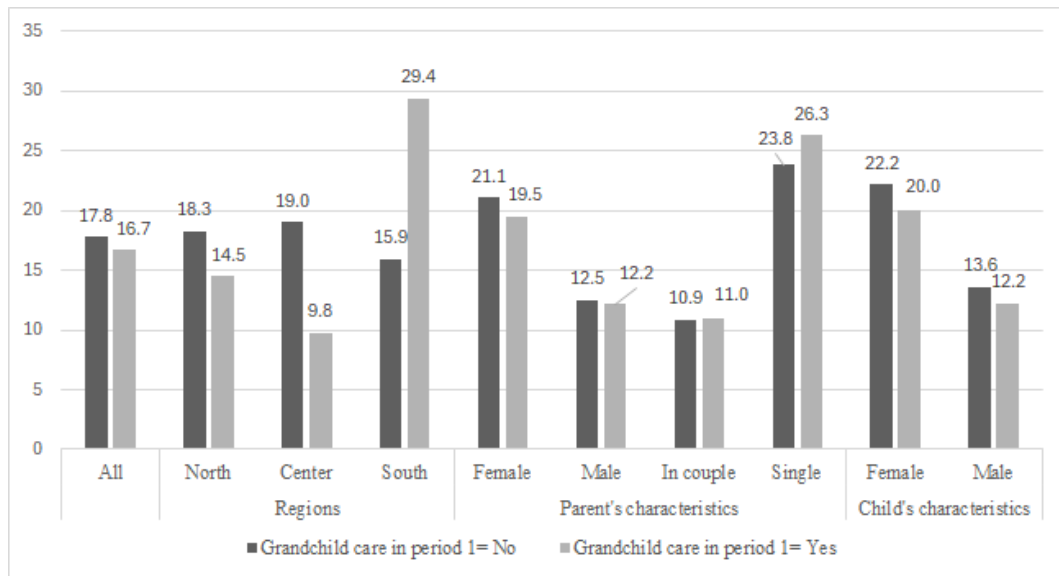


Figure 1: Grandparent care in period 2 w.r.t grandchild care in period 1 (%)

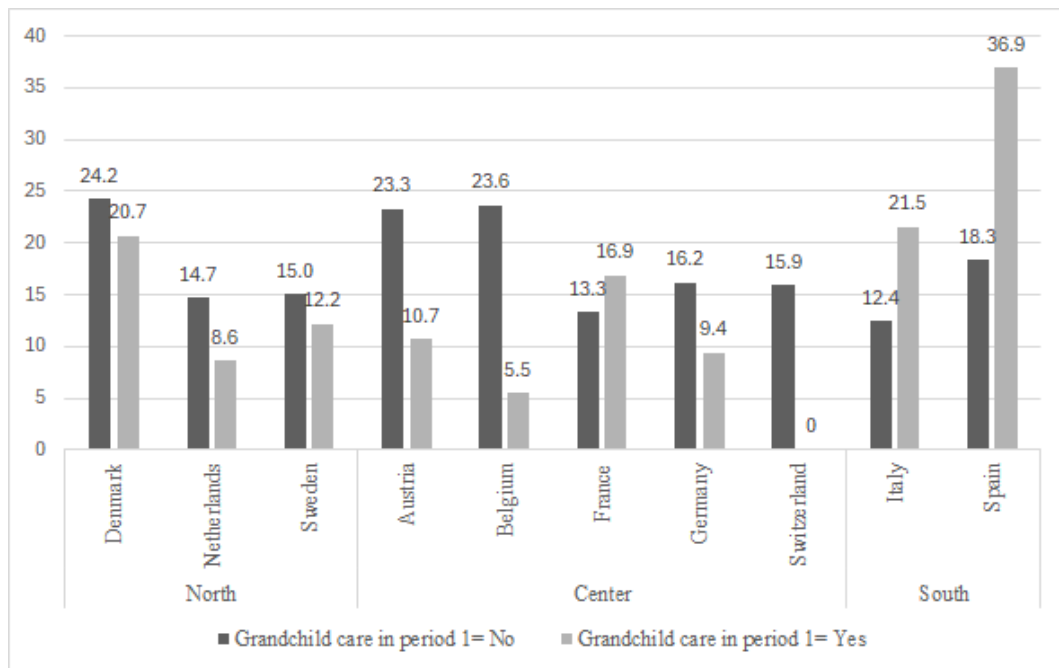


Figure 2: Grandparent care in period 2 w.r.t grandchild care in period 1 (%) by countries

respondents' adult children for which we observe whether they helped their parents. This means that for a given SHARE respondent, we can observe several observations

if she has more than one adult child. To take care of this, we follow Alessie et al. (2014) and Klimaviciute et al. (2017) and treat the dataset as a panel, where the cross sectional dimension is given by the grandparents, while the longitudinal one represents adult children (parents). Doing this, we can control for correlated parent-specific effects by estimating the model with random effects:

$$A_{i,j} = \beta_1 + \beta_2 E_{i,j} + X_i \beta_3 + M_{i,j} \beta_4 + v_i + \varepsilon_{i,j} \quad (3)$$

where $A_{i,j}$ indicates if grandparent i received help from adult child j and $E_{i,j}$ is equal to one if the grandparent i took care of grandchildren from adult child j , zero otherwise. X_i and $M_{i,j}$ are sets of control variables specific to grandparents and their adult children respectively. v_i is a parent specific-effect, and ε_{ij} are idiosyncratic error terms.

Because grandparents' explaining variables do not vary in our sample, we cannot rely on a fixed effect approach. However, the random effects estimator assume that the grandparent-specific unobserved effect is uncorrelated with all explanatory variables which is a strong assumption. An alternative solution is to estimate a correlated random effects model, as suggested by Mundlak (1978), to estimate the effects of within individual changes in the variables of interest. The grandparent specific effect is expressed as a linear function of the average grandparent-varying explanatory variables across adult children, plus a random individual specific effect that is assumed to be independent of the explanatory variables:

$$v_i = \zeta_0 \bar{E}_i + \bar{M}_i \zeta_1 + \xi_i$$

where $\bar{E}_i$ and $\bar{M}_i$ are the individual means of $E_{i,j}$ and $M_{i,j}$. ξ is i.i.d. normal distributed with mean zero and variance σ_ξ^2 . Equation (3) can then be rewritten as:

$$A_{i,j} = \beta_1 + \beta_2 E_{i,j} + X_i \beta_3 + M_{i,j} \beta_4 + \zeta_0 \bar{E}_i + \bar{M}_i \zeta_1 + \xi_i + \varepsilon_{i,j}$$

Since our dependent variable is binary we estimate both a linear probability model and a Probit model. To control for the correlation of errors and regressors within observation of a given grandparent, we estimate the models with standard errors clustered at the grandparent level. This allows us to account for potential dependence between observations, and ensures the analysis is also robust to heteroscedasticity. In X_i , we include grandparent characteristics such as sex (*Female_i*), age (*Age_i*), whether she is in couple (*In couple_i*), the wealth expressed in terciles (*Low wealth_i*, *Medium wealth_i*) and if the grandparent declares to be in less than very good wealth (*Bad health_i*). For adult children characteristics, we consider the sex (*Female_j*), the level of education (*Education_j*), the number of grandchildren (*# children_j*) and a series of dummies for marital status (Married and living together with spouse, Registered partnership, Married and living separated from spouse, Never married, Divorced, Widowed) and occupational status (Full-time employed, Part-time employed, Self-employed or working for own family business, Unemployed, In vocational training/retraining/education, Parental leave, In retirement or early retirement, Permanently sick or disabled, Looking after home or family). We could have also included the distance of the grandchild location but it is highly correlated with our variable of interest which is a dummy if the grandparent took care of grandchildren.

4 Empirical results

Following our empirical strategy, we estimate the effect of taking care of grandchildren on the probability to be helped by adult children (the parents). We compare both random effects model (RE) and correlated random effects model (CRE) and

for each we estimate a linear probability model (LPM) and Probit model since the dependent variable is binary. In the latter case, we report marginal effects.

4.1 Baseline estimation

Table 4 presents the baseline estimation when we use our total sample with the dependence condition for the grandparent in section 2. In the next subsection, we present heterogeneity and sensitivity analysis. Estimated coefficients of the CRE model are not statistically different from those estimated with the RE model. Results are very similar whether we estimate the model by OLS or a Probit model. Overall, the effect of having taken care of grandchildren has a positive and significant at 5% level on the likelihood to receive help from children. This results confirm the validity of the theoretical model that predicted the intergenerational exchange of help.

As regards to the other variables, the results confirm that elderly grandparents are more likely to receive help from their child if she is a women but less if she has a partner. In the latter case, there appears to be a substitutability in help between partners and adult children. This is something we explore below when looking at the interaction effects with marital status. Though we condition our sample of estimation of having at least one ADL, we also look at the self-perceived state of health that is, as expected, correlated with the probability of receiving informal care. Finally being a female seems to increase the likelihood of receiving care in the second period, one explanation being that they outlive the husbands they had taken care of. We will explore more closely the gender difference in the heterogeneity analysis.

4.2 Heterogeneity and sensitivity analysis

We now perform a series of additional estimations to explore robustness of our results as well as the heterogeneity of effects. Since results from different estimations are very similar (as shown in Table 4), We only present the CRE linear probability

Table 4: Estimation results

	Random effects		Correlated random effects	
	LPM	Probit	LPM	Probit
	(1)	(2)	(3)	(4)
<i>Grandchild care ($E_{i,j}$)</i>	0.039** (0.016)	0.041*** (0.016)	0.046** (0.022)	0.048** (0.021)
Parent characteristics				
<i>Female_j</i>	0.088*** (0.017)	0.081*** (0.016)	0.084*** (0.020)	0.074*** (0.018)
<i>Education_j</i>	0.006 (0.007)	0.005 (0.006)	0.003 (0.010)	0.003 (0.009)
<i>Children_j</i>	0.005 (0.009)	0.006 (0.007)	0.007 (0.011)	0.006 (0.009)
Grandparent characteristics				
<i>Female_i</i>	0.057*** (0.018)	0.055*** (0.019)	0.055*** (0.018)	0.053*** (0.019)
<i>In couple_i</i>	-0.090*** (0.021)	-0.084*** (0.020)	-0.094*** (0.021)	-0.089*** (0.020)
<i>Age_i</i>	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
<i>Low wealth_i</i>	-0.016 (0.025)	-0.007 (0.024)	-0.011 (0.025)	-0.004 (0.025)
<i>Medium wealth_i</i>	0.036 (0.026)	0.045* (0.025)	0.035 (0.026)	0.046* (0.025)
<i>Bad health_i</i>	0.129*** (0.026)	0.224*** (0.075)	0.132*** (0.027)	0.236*** (0.073)
<i>N</i>	2428	2428	2428	2428

Notes: Standard errors are clustered at the individual level and reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All specifications contain country fixed effects as well as a series of dummies for marital status (Married and living together with spouse, Registered partnership, Married and living separated from spouse, Never married, Divorced, Widowed) and occupational status (Full-time employed, Part-time employed, Self-employed or working for own family business, Unemployed, In vocational training/retraining/education, Parental leave, In retirement or early retirement, Permanently sick or disabled, Looking after home or family) of the parent. Probit results report marginal effects estimated at the mean.

model⁵. Table 5 present the results for our variable of interest. Complete results are available in the appendix.

We first exploit variation between countries. In Table 5, we interact all variables in the baseline model with the north, central and south European country groups

⁵Results are similar for other estimations and are available upon request.

that we presented earlier. Interestingly, the results observed in the first panel of Table 4 on the effect of taking care of grandchildren only holds in the Southern countries of Europe suggesting that it is the specific family arrangements in the southern Europe that drive our results.

As shown in Table 4, having a partner at home reduces the likelihood of receiving help from the children. We then interact all variables with having a partner or not. In the second panel of Table 5, it appears that our baseline results are mainly driven by single grandparents. This is an important results since it confirms previous empirical observation of substitutability between informal care given by partner and children Bolin et al. (2008). As long as the partner is alive, she is most often the informal caregiver, while adult children take the main responsibility for assisting their single-living parents. Looking at a gender difference, we observe a significant effect for women but no significant effect for men. However this result is related to the presence of a partner since 72.1% of men in our sample live with a partner but only 40.1% of women. Women are also on average older than men but we do not observe significant difference when we estimate our model by different age groups.

We also test the robustness of our results to different samples. All our estimations are based on two main conditions: not needing long term care when taking care of grandchildren but needing it in the period of observations. We successively relax these conditions to see if the hypothesis of intergenerational transfer of care holds whatever the needs. We also test the effect when we take a more conservative condition of dependence and consider having two or more limitations⁶. In Table 5, all specifications display significant effect of our variable of interest, confirming our theoretical predictions.

Finally we look at the intensive margin of childcare given by grandparents. So far, we only looked if the grandparents took care of their grandchildren but the positive

⁶A person is usually considered dependent if she has two or more limitations in daily tasks.

effect we observe may also be dependent on the intensity of this help, i.e. how often they took care of grandchildren. In SHARE we have information on how often they did it: almost daily (4.7%), almost every week (9.5%), almost every month (6.3%) and less often (10.5%). 69% of our sample did not provide grandchild care. We thus test if there is variation according to the intensity of childcare. In the last panel of Table 5, we present the results for both RE and CRE for the linear probability model where the reference is the absence of grandchildcare. We find that the probability to receive care from the parents depends much on the intensity of care given to children. It is only for those who took care of grandchildren on a very regular basis that we observe a significant (or marginally significant) effect.

Table 5: Heterogeneity and sensitivity analysis

<i>By country groups</i>			
	North	Center	South
Grandchild care ($E_{i,j}$)	0.001 (0.040)	0.003 (0.032)	0.156*** (0.048)
N	632	1028	768
<i>By presence of a partner</i>			
	Single	In couple	
Grandchild care ($E_{i,j}$)	0.094** (0.039)	0.028 (0.025)	
N	1183	1245	
<i>By sex</i>			
	Men	Women	
Grandchild care ($E_{i,j}$)	0.013 (0.037)	0.076*** (0.030)	
N	929	1499	
<i>Different samples</i>			
	Two ADL	No ADL	All
Grandchild care ($E_{i,j}$)	0.085** (0.039)	0.013** (0.006)	0.017*** (0.006)
N	1202	14328	16757
<i>Intensity</i>			
	RE	CRE	
Less often	0.020 (0.024)	0.030 (0.028)	
Almost every month	0.019 (0.027)	0.027 (0.032)	
Almost every week	0.063** (0.027)	0.072** (0.031)	
Almost daily	0.063* (0.036)	0.071* (0.039)	
N	2428	2428	

Standard errors are clustered at the individual level and reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All specifications contain same covariates as in Table 4 as well as country fixed effects and a series of dummies for marital status (Married and living together with spouse, Registered partnership, Married and living separated from spouse, Never married, Divorced, Widowed) and occupational status (Full-time employed, Part-time employed, Self-employed or working for own family business, Unemployed, In vocational training/retraining/education, Parental leave, In retirement or early retirement, Permanently sick or disabled, Looking after home or family) of the parent. Probit results report marginal effects estimated at the mean.

5 Conclusion

The dynamics of caregiving within families often encompass both grandchild care and the care of grandparents. These roles are intergenerational and multifaceted, involving emotional, physical, and financial aspects. The benefits of both types of care are evident, and encouraging such caregiving practices is important, provided they do not jeopardize the caregiver's health.

A critical question often raised about these caregiving roles concerns the underlying motivation. Traditionally, families have been viewed as cooperative units driven by altruistic motives. However, this perspective has been challenged, and an alternative approach suggests that caregiving is motivated by an exchange rather than pure altruism. This paper adopts this exchange-based viewpoint and develops a non-cooperative model of subgame-perfect Nash equilibrium, where the parent acts as the Stackelberg leader and the grandparent as the follower. From this model, we derive a relationship between the care provided by grandparents and the care they receive in return.

We tested this hypothesis using SHARE data from ten countries. This data includes information on the care provided by healthy grandparents to their grandchildren and the care these grandparents later received from their own adult children in cases of disability. Our primary finding is that grandchild care indeed fosters elder care. Additionally, we demonstrate that the relationship between these two types of care is robust to alternative specifications and that intensity matters. We also show that it varies across countries with a sharp contrast between southern Europe and the other countries.

The policy implications of our findings are significant. Government and non-profit programs can offer financial assistance, caregiver support, and resources to help manage caregiving responsibilities. Policies that support paid family leave and

flexible work arrangements, benefiting those balancing caregiving roles, should be promoted.

In conclusion, the care of both grandchildren and grandparents involves a complex interplay of benefits and challenges. Strong family communication, community support, and the appropriate use of resources can enhance the well-being of all involved.

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A Appendix

Table A.1: Sample statistics without dependence condition in period 2

	<i>Parent</i>		
	North	Center	South
Grandchild care in period 1 (%)	54.6	53.5	45.0
Female (%)	57.7	58.6	58.6
Age (mean; s.d.)	72.4	72.4	74.2
In couple (%)	70.7	68.0	73.6
Wealth (1000 euros, mean; s.d.)	288.5 (371.4)	336.2 (501.6)	239.4 (579.1)
Self-perceived health	37.4	19.8	11.1
At least one ADL limitation (%)	62.6	80.2	88.9
N	9.5	13.9	17.7
	3245	3786	2002
Child			
Grandparent care in period 2 (%)	7.7	8.0	10.4
Female (%)	53.0	53.9	51.7
In couple (%)	79.4	77.6	89.3
Number of children (mean; s.d.)	2.06 (0.95)	1.96 (0.92)	1.80 (0.90)
Education Level	17.0	11.2	53.5
Work status	42.9	49.9	31.9
N	40.1	38.9	14.6
	72.5	69.7	71.8
	14.7	14.9	4.2
	12.8	15.4	24.0
	4637	5156	2674
			12467

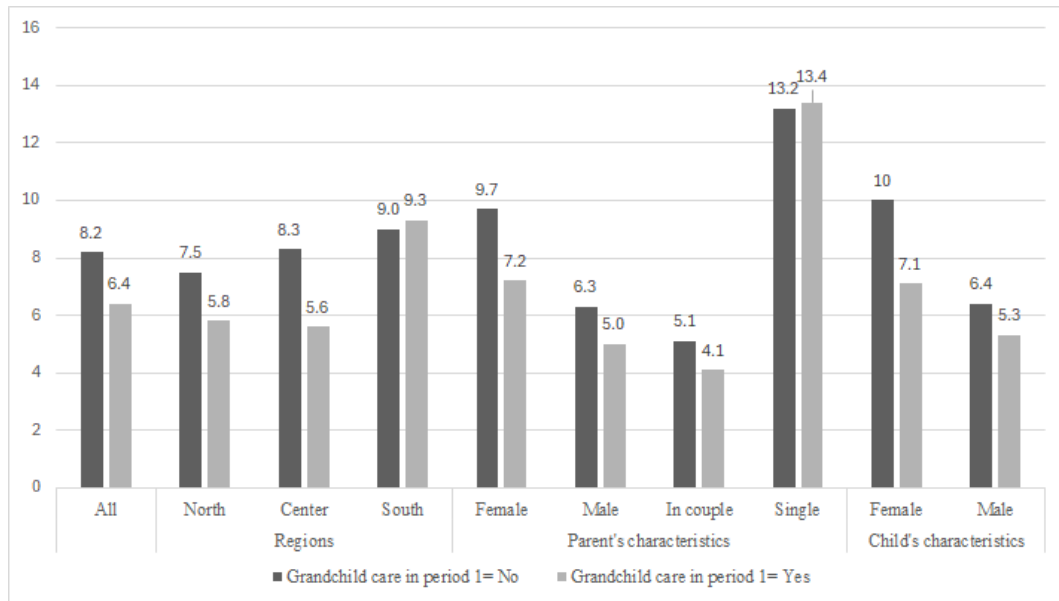


Figure A.1: Grandparent care in period 2 w.r.t grandchild care in period 1 (%; without dependence condition)

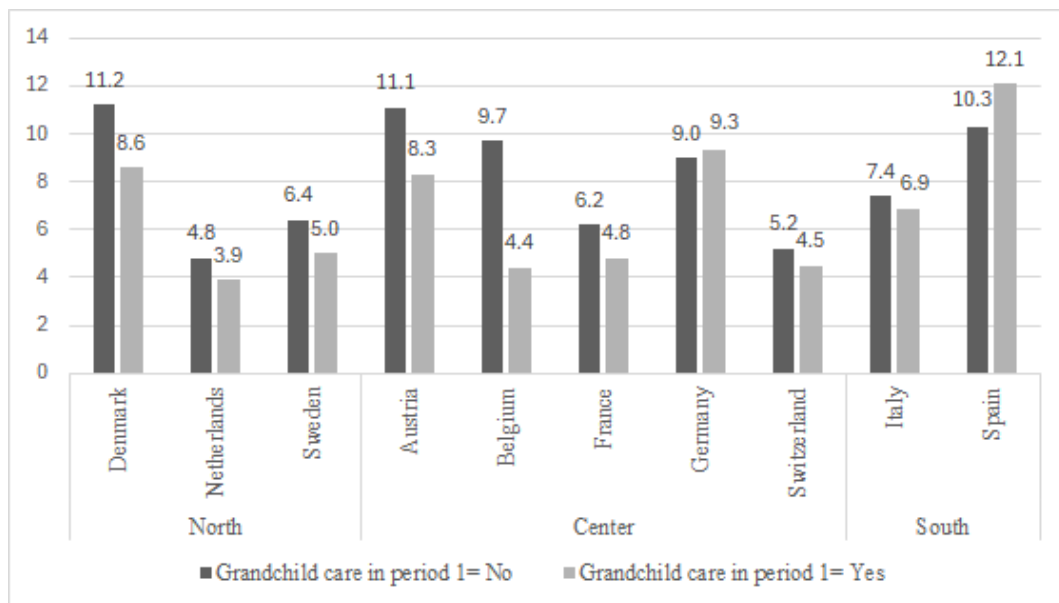


Figure A.2: Grandparent care in period 2 w.r.t grandchild care in period 1 by countries (%; without dependence condition)

Table A.2: Estimations by group of countries

	(1)	(2)	(3)
	North	Center	South
Grandchild care ($E_{i,j}$)	0.001 (0.040)	0.003 (0.032)	0.156*** (0.048)
Parent characteristics			
<i>Female_j</i>	0.071* (0.039)	0.024 (0.033)	0.154*** (0.036)
<i>Education_j</i>	0.004 (0.017)	0.011 (0.015)	-0.007 (0.021)
<i>Children_j</i>	-0.037* (0.020)	0.019 (0.018)	0.011 (0.017)
Grandparent characteristics			
<i>Female_i</i>	0.008 (0.038)	0.088*** (0.024)	0.057 (0.040)
<i>In couple_i</i>	-0.172*** (0.044)	-0.095*** (0.031)	-0.032 (0.041)
<i>Age_i</i>	0.005** (0.003)	0.007*** (0.002)	0.005** (0.002)
<i>Low wealth_i</i>	-0.020 (0.055)	-0.051 (0.034)	0.003 (0.048)
<i>Medium wealth_i</i>	-0.009 (0.055)	0.051 (0.037)	0.031 (0.052)
<i>Bad health_i</i>	0.159*** (0.037)	0.115*** (0.042)	0.120 (0.090)
<i>N</i>	632	1028	768

Notes: Standard errors are clustered at the individual level and reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All specifications contain country fixed effects as well as a series of dummies for marital status (Married and living together with spouse, Registered partnership, Married and living separated from spouse, Never married, Divorced, Widowed) and occupational status (Full-time employed, Part-time employed, Self-employed or working for own family business, Unemployed, In vocational training/retraining/education, Parental leave, In retirement or early retirement, Permanently sick or disabled, Looking after home or family) of the parent.

Table A.3: Estimations by marital status and sex

	(1)	(2)	(3)	(4)
	Single	With partner	Men	Women
Grandchild care ($E_{i,j}$)	0.094** (0.039)	0.028 (0.025)	0.013 (0.037)	0.076*** (0.030)
Parent characteristics				
<i>Female_j</i>	0.100*** (0.032)	0.067** (0.026)	0.038 (0.030)	0.107*** (0.027)
<i>Education_j</i>	0.007 (0.017)	-0.000 (0.012)	0.002 (0.015)	0.003 (0.014)
<i>Children_j</i>	0.002 (0.015)	0.013 (0.015)	0.004 (0.018)	0.008 (0.013)
Grandparent characteristics				
<i>Female_i</i>	0.143*** (0.032)	-0.004 (0.022)	-	-
<i>In couple_i</i>	-	-	0.002 (0.033)	-0.149*** (0.028)
<i>Age_i</i>	0.007*** (0.002)	0.005*** (0.001)	0.007*** (0.002)	0.005*** (0.002)
<i>Low wealth_i</i>	-0.028 (0.047)	0.008 (0.028)	0.041 (0.033)	-0.055 (0.037)
<i>Medium wealth_i</i>	0.055 (0.054)	0.028 (0.030)	0.100*** (0.035)	-0.021 (0.039)
<i>Bad health_i</i>	0.174** (0.084)	0.100*** (0.019)	0.130*** (0.030)	0.123*** (0.041)
<i>N</i>	1183	1245	929	1499

Notes: Standard errors are clustered at the individual level and reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All specifications contain country fixed effects as well as a series of dummies for marital status (Married and living together with spouse, Registered partnership, Married and living separated from spouse, Never married, Divorced, Widowed) and occupational status (Full-time employed, Part-time employed, Self-employed or working for own family business, Unemployed, In vocational training/retraining/education, Parental leave, In retirement or early retirement, Permanently sick or disabled, Looking after home or family) of the parent.

Table A.4: Estimations for different samples

	(1) Two ADL	(2) No ADL	(3) All
Grandchild care ($E_{i,j}$)	0.085** (0.039)	0.013** (0.006)	0.017*** (0.006)
Parent characteristics			
<i>Female_j</i>	0.138*** (0.030)	0.027*** (0.006)	0.036*** (0.006)
<i>Education_j</i>	-0.014 (0.014)	-0.001 (0.003)	-0.000 (0.003)
<i>Children_j</i>	-0.004 (0.016)	-0.000 (0.003)	0.001 (0.003)
Grandparent characteristics			
<i>Female_i</i>	0.090*** (0.030)	0.008* (0.004)	0.015*** (0.005)
<i>In couple_i</i>	-0.106*** (0.035)	-0.051*** (0.007)	-0.063*** (0.006)
<i>Age_i</i>	0.005*** (0.002)	0.003*** (0.000)	0.004*** (0.000)
<i>Low wealth_i</i>	-0.046 (0.045)	-0.001 (0.006)	0.001 (0.006)
<i>Medium wealth_i</i>	-0.010 (0.048)	0.003 (0.005)	0.008 (0.005)
<i>Bad health_i</i>	0.246*** (0.057)	0.020*** (0.005)	0.032*** (0.005)
<i>N</i>	1202	14328	16757

Notes: Standard errors are clustered at the individual level and reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All specifications contain country fixed effects as well as a series of dummies for marital status (Married and living together with spouse, Registered partnership, Married and living separated from spouse, Never married, Divorced, Widowed) and occupational status (Full-time employed, Part-time employed, Self-employed or working for own family business, Unemployed, In vocational training/retraining/education, Parental leave, In retirement or early retirement, Permanently sick or disabled, Looking after home or family) of the parent.

Table A.5: Intensity

	(1)	(2)
	RE	CRE
Less often	0.020 (0.024)	0.030 (0.028)
Almost every month	0.019 (0.027)	0.027 (0.032)
Almost every week	0.063** (0.027)	0.072** (0.031)
Almost daily	0.063* (0.036)	0.071* (0.039)
Parent characteristics		
<i>Female_j</i>	0.087*** (0.017)	0.082*** (0.021)
<i>Education_j</i>	0.006 (0.007)	0.003 (0.010)
<i>Children_j</i>	0.005 (0.009)	0.007 (0.011)
Grandparent characteristics		
<i>Female_i</i>	0.056*** (0.018)	0.054*** (0.018)
<i>In couple_i</i>	-0.090*** (0.021)	-0.093*** (0.021)
<i>Age_i</i>	0.006*** (0.001)	0.006*** (0.001)
<i>Low wealth_i</i>	-0.015 (0.025)	-0.011 (0.025)
<i>Medium wealth_i</i>	0.035 (0.026)	0.035 (0.026)
<i>Bad health_i</i>	0.129*** (0.026)	0.133*** (0.027)
<i>N</i>	2428	2428

Notes: Standard errors are clustered at the individual level and reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All specifications contain country fixed effects as well as a series of dummies for marital status (Married and living together with spouse, Registered partnership, Married and living separated from spouse, Never married, Divorced, Widowed) and occupational status (Full-time employed, Part-time employed, Self-employed or working for own family business, Unemployed, In vocational training/retraining/education, Parental leave, In retirement or early retirement, Permanently sick or disabled, Looking after home or family) of the parent.