Retirement and Informal Care-giving: Behavioral Patterns among Older Workers

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Abstract: This paper uses panel data from the Survey of Health, Aging and Retirement in Europe (SHARE) to study the effect of care-giving on retirement. The findings suggest that care- and support-giving contributes to the retirement decision, in particular for men. While the frequency of care activities is more influential in the male retirement decision, the most important factor for women turns out to be out-of-household care.

JEL Classification: I19, J26, J22.

Keywords: informal care-giving, retirement; economics of aging; panel data.

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1 Introduction

Older workers frequently engage in support and care activities for people in their social networks. Beside the growing market for institutional, mobile and in-house care for older adults, informal support and care activities have maintained their importance within the larger family context. In the light of financing constraints of public expenditures for elderly care, traditional care-giving in the social network might not be substituted fully by professional care. For older workers, such activities are typically increasing pressures on their leisure time as many of them reallocate their time budgets towards less hours of labor supply. At the same time, the extent to which older workers engage in such activities determines the extent of labor supply reduction, in many cases leading to a full withdrawal from the labor force, and - if feasible - to the take-up of retirement. This paper attempts to quantify the effect of informal support or care on retirement. Yet, we realize that support activities for other people materialize in various ways and intensities, not only in the form of classical parental care-giving in the household. Consequently, we see the need to define support and care-giving as broadly as possible in order to capture these important variations, ranging from minimal household help on an occasional basis up to intense daily care "around the clock".

This paper investigates the effect of support and care giving of older workers on retirement, taking into account a comprehensive set of dimensions over which these activities span. The novelty of our approach is a rather broad definition of such activities, exploiting recent survey data on older people in Europe. Our findings underline the importance of care-giving for the retirement decision, showing behavioral differences across gender, intensity and type of activity.

The empirical strategy entwines around a binary indicator of retirement as the dependent variable. Two different specifications are deployed in order to capture the effect of care and support giving on retirement. First, the "bird perspective" approach with a unique indicator variable for engaging in any sort of activity related to support or

care on an informal basis. In order to better understand the particular factors for care-givers to take up retirement, our second specification uses variables spreading out the numerous aspects and dimensions of support and care activities. We consider informal care only which naturally excludes care professionals, except they were to provide care or support during their leisure time to people in their social networks.

The following section discusses previous findings on the determinants of the retirement decision and on informal care-giving.

2 Previous related literature

Many studies have been dealing with the retirement decision, yet, causal factors like informal care-giving only recently got more attention. Financial incentives have been identified as important determinants of the retirement decision Gruber and Wise (2004), since pension benefit computations embed behavioral signals with respect to the timing of retirement. Another strand of research is retirement coordination among couples; Blau (1998) or Bingley and Lanot (2007) more recently find evidence of joint retirement, leading to the conclusion of preferences for sharing leisure as an important consideration among couples. Further considerations for retirement come from someone's health status; Rust and Phelan (1997) and Sammartino (1987) draw their attention to the health status of retirees, and find evidence of poor health encouraging early retirement. institutional arrangements promoting or discouraging retirement. Authors such as Hurd (1996) deal with institutional constraints encouraging retirement, for instance hours of work restrictions, cost of older labor, and age discrimination. On the demand side for labor, employers' attitudes towards older workers bear substantial implications for retirement behavior. However, these ideas have not been empirically fully investigated. Another important feature for the retirement decision is care-giving within one's social network or family.

Let us now turn to the discussion of this relatively young research agenda. Two major

directions have been investigated, the nature of informal-care as a good, and the impact of informal care on labor supply dimensions. Considering the first line of research, Bolin *et al.* (2008) test whether informal care by children or grandchildren is a substitute or complement to formal care. They find that formal and informal care are substitutes, and informal care is a complement to doctor and hospital visits. Likewise, Bonsang (2009) investigate the question whether informal care by adult children is a substitute for long-term care in a formal way. They find that informal and formal long-term care are substitutes, independent of the degree of disability of the person given care to. Moreover, Van Houtven and Norton (2004) find that informal care reduces formal home care use and delays entry into nursing home services. So, for the financing of the increasing demand for elderly care, the findings related to the substitutability of formal and informal care might become important for policy in near future.

Labor supply aspects have been approached from various angles. Summarizing the findings of the rudimentary "older" literature, Gorey *et al.* (1992) point out that up to a third of informal care-giving leads to labor market exit. Dentinger and Clarkberg (2002) emphasize the importance of the closeness of care giver and care recipient and of the gender of the care giver when analyzing the effect of informal care giving on retirement. Also, Van Houtven *et al.* (2013) find an effect of care giving on hours of work and wages, but only for females. Skira (2015) find that women have low probabilities to return to their job after a spell of leave from work for the purpose of care-giving. Lee *et al.* (2015) point out that females on lower household income are more likely to provide informal care. Also, He and McHenry (2016) find a strong link between informal care-giving and the workplace. Reverting the chain of causality, they conclude that for women at per-retirement age, working 10 percent more hours results in a decrease of the probability of providing informal care. Vlachantoni (2010) also stresses the gender differences of care giving activities. An interesting side issue has been investigated by Jacobs *et al.* (2015) who attempt to identify whether women giving informal care have different patterns of labor force participation according to

the generation they belong to. They contrast "Baby Boomers" and the generation born pre-World-War II, finding no evidence of generation gaps in hours of work and labor force participation. This paper contributed to the literature in the two ways; first, we decompose care and support giving into important dimensions to study in depth the conditions under which these activities contribute to retirement. Second, we apply a rather broad notion of informal care- and support-giving going beyond the definitions previously used. Third, novel micro-data has become available for Europe which serves as a base of most current empirical evidence.

The next section discusses the empirical strategy and the data used.

3 Empirical strategy

3.1 Empirical model

In order to estimate the retirement impact of care- and support-giving of older workers, we use a binary logit model in which $y^*$is the underlying latent variable for the propensity to retire according to

$$y^* = x'\beta + u \tag{1}$$

where x' is a vector of explanatory variables including care and support variables, socio-demographics, country and year fixed effects. Since $y^*$is not observed, we use observed retirement choices, where a value of one represents being retired, and a value of zero stands for any labor market status other than retired (employed, unemployed, etc.). The error term u follows a logistic distribution. The latent variable and the observed dependent variable relate to each other in the following way:

$$y = \begin{cases} 1 \;\; if \quad y^* > 0 \\ 0 \;\; if \quad y^* \leq 0 \end{cases} \tag{2}$$

The marginal effects of the coefficients estimated can legitimately be interpreted as ceteris-paribus causal impacts on the probability to retire. We run regressions separately by gender, while two model specifications are deployed for each gender. First, we estimate an equation with a single explanatory variable for giving support or care. The variable *Care* is coded as a dummy just indicating support- or care-giving, no matter how intense or how frequent this engagement is. Second, we use a specification based on a set of variables on the various dimensions of support and care activity. These variables include information where care was given, i.e., inside or outside the household of the caregiver, how much time was spent on giving support or care, and the number of people who received care or support from the person observed; these variables are discussed in section 4.2.

3.2 Data and sample selection

For the empirical analysis, data from the Survey of Health, Aging and Retirement in Europe (SHARE) are used. Observations come from waves 1, 2, and 4, appended into a panel of older workers. The logic of the analysis requires that people in the panel have not yet retired during their first observed spell. Retirement is an absorbing state, therefore, we include the first year of retirement only, but not the second and consecutive years in this state of nature. The panel only includes people taking up retirement during the years observed in the panel window, but not before. Furthermore, we do not impose the restriction that every person needs to retire while being observed. Thus, an interpretation of the predictions for the dependent variable is in fact the probability of retirement conditional on observing at least one spell of work activity during the interview years. The descriptive and regression analysis are done separately by gender. Here, the male sample consists of 4,639 persons observed over 7,052 observations. In the female sample, there are 4,157 persons spanning over 6,333 observations. Both samples include the age groups between 55 and 70 years. Excluded are people over the age of 70, since these cohorts are unlikely to face a choice between labor force participation and

retirement any more. In order to account for retirement out of employment, we include people reporting remunerated work activity at least in their initial observation. With respect to their labor force status, we include people reporting to be employed, self-employed, civil servant, unemployed, homemaker or to be retired during any interview year.

Interviews for wave 1 of SHARE were conducted in 2004 and 2005, for wave 2 in 2006 to 2007, and for wave 4 in 2011 to 2012. Wave 3 had to be excluded because it was designed to retrieve work histories and other life course information. Naturally, the panel is unbalanced and has some degree of attrition as often observed in similar micro-surveys. Therefore, most individuals are not observed in all three waves, and they may join the panel as refreshment in waves later than wave 1.

We had to drop several observations due to missing values in key variables. We also excluded observations from countries where very few interviews had been conducted. Also, some countries joined the SHARE survey in wave 3, and therefore those observations were dropped. However, the set of countries used in the present paper embeds all major economies in Europe such that our results can be generalized in a meaningful way. Observations come from Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Greece, Switzerland, Belgium, the Czech Republic, Poland and Denmark. Finally, we dropped non-reported and implausible observations, resulting in two cleaned panels of 13,385 person-year observations originating from 8,796 individuals. The following section discusses descriptive statistics of these samples, in particular summary measures of the support and care variables.

4 Descriptive statistics

4.1 Sample characteristics

Observations in the male sample have an average age of 59.6 years, female observations average at 59.3 years of age (Table 1). No important gender differentials exist for self-reported health; means range between "very good" and "good" health across both samples. 87.1 percent of men and 75.2 percent of women live together with their partner or spouse in a household. This differential is likely to be explained by a generally higher life expectancy of women. Education years come close across both samples at around 12 years. The number of children is on average 2.1 for men and 2 for women. The analysis also includes a set of country dummies, for which summary measures are not reported in Table 1. Finally, a set of year dummies complete the range of variables. We might note that the period 2008 to 2010 is not included in the samples due to the specific design of wave 3 in SHARE.

Table 1. Sample characteristics

Variable	Description	Males		Females	
		Mean	SD	Mean	SD
Retirement cases	Dummy, 1 if retire, 0 otherwise	0.147	0.354	0.139	0.346
Income decile	Position in income distribution	6.859	2.608	6.485	2.687
Age	Age at interview	59.553	3.237	59.256	3.162
Health	Self-perceived, 1 if excellent, ..., 5 if poor	2.637	0.991	2.636	0.987
Partnerhh	Cohabitation dummy, 1 if yes, 0 otherwise	0.871	0.335	0.752	0.432
Education	Years of education	12.303	4.305	12.122	4.074
Kids	Number of children	2.113	1.1228	2.044	1.175
Number of observations		7,052		6,333	
Number of individuals		4,639		4,157	

4.2 Dimensions of informal care and support

SHARE provides a set of discrete survey questions covering various aspects of giving care or support to other people. In Table 2, we report summary statistics and explain the content of the care variables used in the analysis; these variables will be denoted in italics throughout. We construct the comprehensive dummy variable *Care* indicating any kind and extent of care- and support-giving. In fact, 31.8 percent of male obser-

vations are coming from personal care or household help, both within and outside the household. In the female sample, this share is higher as we would expect, amounting to 37.5 percent. The dummy variable *Incare* is defined as giving daily care in the household, which we would hypothesize to be a rather intense activity. It has a higher share for women, 4.4 percent, in contrast to men with only 3.7 percent. For *Carehelp*, a dummy variable indicating care or household help outside the household - which also reports activities less frequent than daily - is higher for women (34.5 percent) compared to men (28.4 percent). *Caretime*, a categorical variable indicating the extent of care in terms of time devoted to these activities, is higher for females as well. As a minor shortcoming, SHARE only reports *Caretime* in case the activity happens outside the household, but not for in-household care. In terms of the number of people given care to, again females are topping males, while in both genders the average number of people cared for is less than one on average.

Table 2. Care-giving variables, in percent of observations

Variable	Description	Males	Females
Care	Dummy, 1 if giving care or support, 0 otherwise	31.07	37.50
Incare (in household)	Dummy giving daily care	3.70	4.42
Carehelp (out of household)	Dummy, care or support	28.42	34.47
Caretime (out of household)	no help	74.56	69.62
	less often	9.34	7.53
	almost monthly	6.34	6.96
	almost weekly	7.36	11.38
	almost daily	2.40	4.50
Outhelpnumber (out of household)	Number of people given care to	0.368	0.428
Number of observations		7,052	6,333
Number of individuals		4,639	4,157

5 Results

We now turn to the discussion of the regression results, which are reported in Table 3 for specification 1 and in Table 4 for specification 2. In order to use a more intuitive way of interpreting logit coefficients, we report both, odds ratios, and average marginal effects. Finally, in order to better grasp the extent of the effect of care-giving on retirement, we compute predicted probabilities of retirement over age, contrasting care givers versus

non-care givers. In general, model specification 1 shows that care mainly matters for males in their retirement decision. This effect for males is however relatively small compared to factors like age, income and cohabitation. For females, health does not impact on the retirement decision. Model specification 2 shows a stronger impact of specific care activities and of the intensity of such activity on retirement. This holds relative to other covariates, but also in comparison to specification 1.

5.1 Results: specification 1

Specification 1 uses a single dummy variable for giving care or household help. For the male sample, this dummy variable is significant, but not for the females. We may interpret the effect of care on retirement then in following way: in case a male person is giving care, his odds of retiring are 1.26 times higher than for a male not giving care. We do not interpret the odds ratio for females due to its statistical insignificance. Regarding the other covariates, we receive significant estimates for age, age2 (only females), some health categories (only males), for living in a household with a partner, for the number of kids (only females) and for some positions in the income distribution. Also, a majority of country dummies and year effects is significant. However, years of education turn out to be insignificant. Deploying the corresponding marginal effects interpretation, the probability of retirement increases by 2 percentage points when giving care as opposed to not giving care. Yet, the magnitude of this effect is among the smallest compared to other covariates.

Table 3: Logit regression, specification 1 - one care dummy

Dep. Variable:	Retired	Males			Females		
		Coefficient	Odds ratio	Marginal effect	Coefficient	Odds ratio	Marginal effect
Age		1.249 (2.46)*	3.488	0.107	2.336 (4.30)**	10.339	0.19
Age2		-0.006 (-1.53)	0.994	-0.001	-0.015 (3.40)**	0.985	-0.001
Health	excellent	omitted			omitted		
	very good	0.234 (-1.59)	1.264	0.019	0.102 (-0.72)	1.107	0.008

	good	0.364 (2.58)**	1.439	0.03	0.231 (-1.67)	1.26	0.018
	fair	0.406 (2.51)*	1.501	0.034	0.314 (-1.9)	1.369	0.025
	poor	0.478 (-1.83)	1.613	0.04	0.237 (-0.69)	1.267	0.019
Partnerhh		0.358 (2.56)*	1.431	0.031	0.321 (2.77)**	1.379	0.026
Educ		-0.018 (-1.76)	0.982	-0.002	-0.008 (-0.65)	0.992	-0.001
Kids		-0.056 (-1.51)	0.945	-0.005	-0.084 (2.12)*	0.92	-0.007
Income decile	1	0.19 (-0.84)	1.209	0.015	0.718 (3.01)**	2.05	0.061
	2	0.602 (2.58)**	1.826	0.052	0.474 (2.05)*	1.607	0.038
	3	0.443 (2.13)*	1.557	0.037	0.488 (2.30)*	1.629	0.039
	4	0.625 (3.36)**	1.868	0.054	0.063 (-0.3)	1.065	0.005
	5	0.518 (2.96)**	1.678	0.044	0.237 (-1.19)	1.267	0.018
	6	0.567 (3.47)**	1.764	0.049	0.373 (2.02)*	1.453	0.029
	7	0.236 (-1.47)	1.266	0.019	0.323 (-1.78)	1.381	0.025
	8	0.227 (-1.47)	1.255	0.018	0.302 (-1.69)	1.353	0.024
	9	0.109 (-0.71)	1.115	0.009	0.093 (-0.53)	1.098	0.007
	10	omitted			omitted		
Care		0.231 (2.50)*	1.26	0.02	-0.005 (-0.05)	0.995	0
Countries	Austria	0.702 (2.72)**	2.017	0.06	0.455 (-1.49)	1.576	0.037
	Germany	0.538 (2.74)**	1.712	0.046	0.238 (-1.21)	1.269	0.019
	Sweden	-0.102 (-0.57)	0.903	-0.009	-0.466 (2.98)**	0.627	-0.038
	Netherlands	0.808 (4.31)**	2.243	0.069	-0.27 -1.36	0.763	-0.022
	Spain	0.212 (-0.92)	1.236	0.018	-1.257 (3.42)**	0.285	-0.102
	Italy	1.044 (4.33)**	2.839	0.089	0.715 (3.07)**	2.045	0.058
	France	1.558 (7.77)**	4.748	0.133	0.559 (3.06)**	1.749	0.045
	Greece	-0.956 (2.36)*	0.384	-0.082	-1.951 (2.57)*	0.142	-0.158
	Switzerland	-0.657 (3.07)**	0.518	-0.056	-1.207 (5.46)**	0.299	-0.098
	Belgium	1.414 (7.46)**	4.111	0.121	0.581 (2.85)**	1.787	0.047
	Czech Rep.	0.138 (-0.68)	1.148	0.012	0.663 (2.98)**	1.941	0.054
	Poland	-0.17 (-0.34)	0.843	-0.015	1.263 (2.77)**	3.536	0.103
	Denmark	omitted			omitted		
Years	2004	-3.06 (5.52)**	0.047	-0.262	-3.099 (5.86)**	0.045	-0.252
	2005	-3.019 (4.33)**	0.049	-0.259	-3.125 (3.68)**	0.044	-0.254
	2006	-0.864 (-1.66)	0.421	-0.074	-0.928 (2.06)*	0.395	-0.075
	2007	-1.305 (2.60)**	0.271	-0.112	-1.256 (2.91)**	0.285	-0.102
	Y2011	-0.97 (-1.91)	0.379	-0.083	-0.846 (-1.92)	0.429	-0.069
	2012	omitted	1	0	omitted	1	0

Constant	-54.462 (3.46)**	-87.902 (5.23)**
LL	-1,985.57	-1,688.47
Wald chi2	1,030.49	886.27
P > chi2	0.000	0.000
Pseudo R2	0.326	0.3381
CPC	0.884	0.884
N	7,052	6,333

Notes: t-statistics in parentheses. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. CPC refers to the share of correctly predicted choices.

5.2 Results: specification 2

This specification uses, instead of a single dummy for care, a set of variables of care in and outside the household, the frequency of care activities, and the number of people cared for. For males and females, results are considerably different. In the male case, the only significant variable is *Caretime*. When the frequency of care goes from daily or almost daily to no care, the odds of retirement is reduced by a factor of 0.41. If care activity goes from daily or almost daily to less than monthly, the odds of retirement go down by a factor of 0.46. In summary, more time spent on care activities increases the probability of retirement as we may expect. For females, giving care or household help outside the household increases the odds of retirement by a factor of 1.8. The other care variables for women turn out to be insignificant. Simultaneously, the remaining covariates largely preserve their significance compared to specification 1. In terms of average marginal effects, the significant care variables in both data sets are of considerable magnitudes compared to the covariates. In case men went from daily to less than monthly care frequencies, a decrease of the probability of retirement by 7.5 percentage points would arise. When women provide care or household help outside their household, their probability of retirement increases by 4.7 percentage points. Other covariates exhibit effects of various magnitudes; cohabitation has lower marginal effects of 3.4 and 2.6 percentage points for males and females, respectively. Yet, age clearly has the highest impact on retirement.

Table 4: Logit regression, specification 2 - care variables

Dep Variable:	Retired	Males Coefficient	Odds ratio	Marginal effect	Females Coefficient	Odds ratio	Marginal effect
Age		1.251	3.494	0.107	2.309	10.061	0.187
		(2.45)*			(4.22)**		
Age2		-0.006	0.994	-0.001	-0.015	0.985	-0.001
		(-1.52)			(3.32)**		
Health	excellent	omitted			omitted		
	very good	0.224	1.251	0.018	0.088	1.092	0.007
		(-1.51)			(-0.62)		
	good	0.357	1.429	0.029	0.224	1.252	0.018
		(2.52)*			(-1.62)		
	fair	0.397	1.487	0.033	0.308	1.361	0.025
		(2.45)*			(-1.85)		
	poor	0.494	1.639	0.041	0.272	1.312	0.022
		(-1.87)			(-0.8)		
Partnerhh		0.393	1.482	0.034	0.325	1.384	0.026
		(2.76)**			(2.77)**		
Educ		-0.019	0.981	-0.002	-0.01	0.99	-0.001
		(-1.78)			(-0.81)		
Kids		-0.054	0.947	-0.005	-0.084	0.92	-0.007
		(-1.43)			(2.11)*		
Income decile	1	0.18	1.198	0.014	0.699	2.013	0.059
		(-0.79)			(2.93)**		
	2	0.617	1.853	0.053	0.464	1.591	0.037
		(2.62)**			(2.00)*		
	3	0.429	1.535	0.036	0.468	1.598	0.038
		(2.07)*			(2.20)*		
	4	0.617	1.853	0.053	0.061	1.063	0.005
		(3.30)**			(-0.29)		
	5	0.512	1.669	0.043	0.214	1.239	0.016
		(2.92)**			(-1.08)		
	6	0.565	1.759	0.048	0.373	1.452	0.029
		(3.44)**			(2.02)*		
	7	0.247	1.28	0.02	0.316	1.372	0.025
		(-1.54)			(-1.76)		
	8	0.223	1.25	0.018	0.29	1.336	0.022
		(-1.44)			(-1.63)		
	9	0.113	1.119	0.009	0.102	1.108	0.008
		(-0.73)			(-0.58)		
	10	omitted			omitted		
Incare		-0.133	0.876	-0.011	-0.434	0.648	-0.035
		(-0.59)			(-1.88)		
Carehelp		-0.236	0.79	-0.02	0.586	1.796	0.047
		(-0.72)			(2.20)*		
Caretime	no help	-0.891	0.41	-0.086	0.418	1.519	0.034
		(2.04)*			(-1.08)		
	less often	-0.767	0.465	-0.075	-0.232	0.793	-0.016
		(2.79)**			(-0.85)		
	almost monthly	-0.401	0.67	-0.042	-0.152	0.859	-0.011
		(-1.42)			(-0.58)		
	almost weekly	-0.196	0.822	-0.021	-0.296	0.744	-0.02
		(-0.71)			(-1.22)		
	almost daily	omitted			omitted		
Outhelpnumber		0.059	1.061	0.005	0.013	1.013	0.001
		(-0.5)			(-0.1)		
Countries	Austria	0.694	2.002	0.059	0.436	1.546	0.035
		(2.67)**			(-1.43)		
	Germany	0.558	1.748	0.048	0.242	1.274	0.02
		(2.81)**			(-1.22)		
	Sweden	-0.089	0.914	-0.008	-0.491	0.612	-0.04
		(-0.5)			(3.12)**		
	Netherlands	0.841	2.319	0.072	-0.274	0.761	-0.022
		(4.45)**			(-1.37)		
	Spain	0.233	1.262	0.02	-1.268	0.281	-0.103
		(-1.0)			(3.41)**		
	Italy	1.052	2.864	0.09	0.707	2.028	0.057
		(4.36)**			(2.99)**		

	France	1.574	4.824	0.134	0.55	1.734	0.045
		(7.80)**			(2.99)**		
	Greece	-0.946	0.388	-0.081	-1.912	0.148	-0.155
		(2.33)*			(2.51)*		
	Switzerland	-0.637	0.529	-0.054	-1.232	0.292	-0.1
		(2.95)**			(5.50)**		
	Belgium	1.394	4.032	0.119	0.586	1.797	0.047
		(7.33)**			(2.85)**		
	Czech Rep.	0.132	1.141	0.011	0.659	1.933	0.053
		(-0.64)			(2.96)**		
	Poland	-0.094	0.91	-0.008	1.276	3.584	0.103
		(-0.19)			(2.77)**		
	Denmark	omitted			omitted		
Years	2004	-3.011	0.049	-0.257	-3.164	0.042	-0.256
		(5.53)**			(5.91)**		
	2005	-2.898	0.055	-0.247	-3.166	0.042	-0.256
		(4.22)**			(3.74)**		
	2006	-0.801	0.449	-0.068	-0.974	0.377	-0.079
		(-1.57)			(2.14)*		
	2007	-1.232	0.292	-0.105	-1.307	0.271	-0.106
		(2.51)*			(2.98)**		
	2011	-0.928	0.395	-0.079	-0.846	0.429	-0.068
		(-1.88)			(-1.9)		
	2012	omitted			omitted		
	_cons	-53.772			-87.501		
		(3.40)**			(5.16)**		
LL		-1,976.02			-1,683.43		
Wald chi2		1,035.29			891.13		
P > chi2		0.000			0.000		
Pseudo R2		0.3289			0.340		
CPC		0.883			0.886		
N		7,052			6,333		

Notes: t-statistics in parentheses. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. CPC refers to the share of correctly predicted choices.

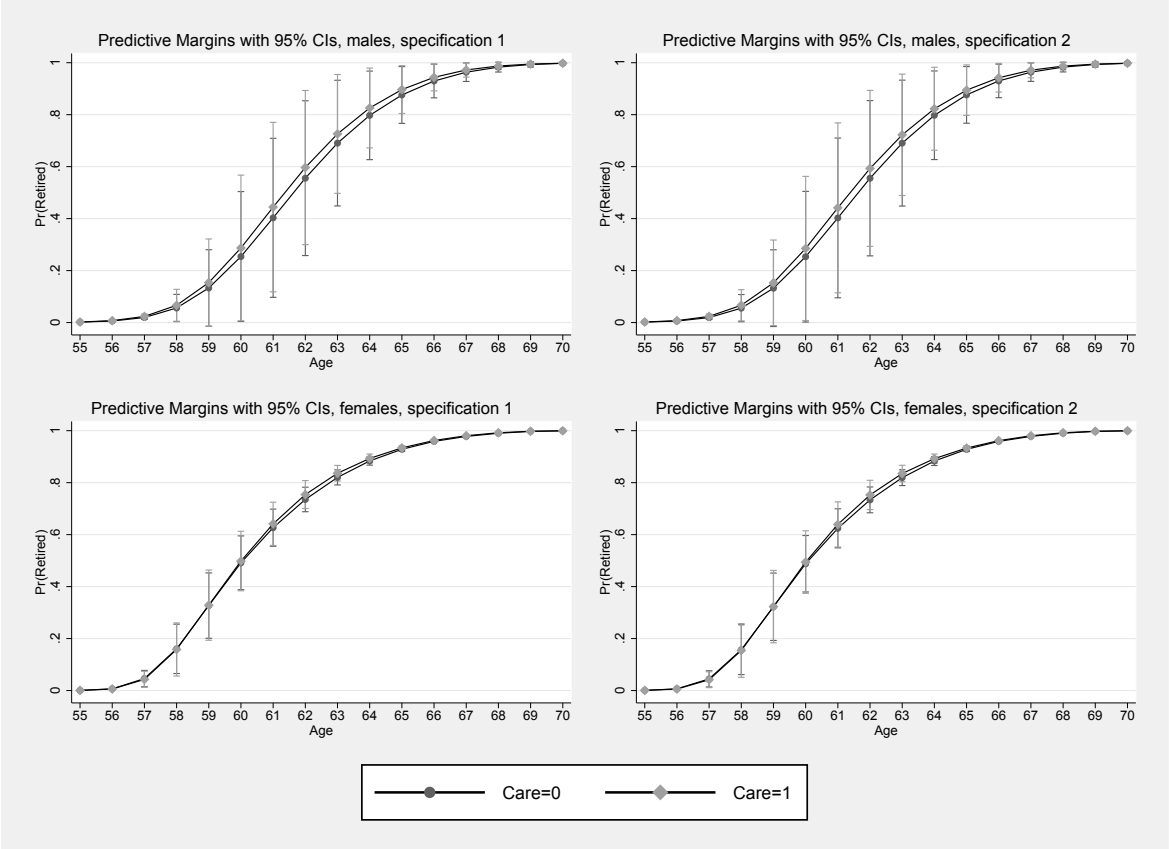
Finally, turning to the goodness-of-fit of the models estimated, no important differences exist across specifications and gender in terms of choices correctly predicted. The proportion of correctly predicted retirement choices for specification 1 is 88.4 percent for both, males and females. Specification 2 yields a model fit of 88.3 percent for males and 88.6 percent for women. Therefore, we obtain a relatively strong goodness-of-fit across all models.

5.3 Predicted retirement probabilities

In order to complete the analysis of the effect of care on retirement, we compare predicted probabilities to retire of care-givers versus non-care-givers. Since age is a crucial factor of the decision to retire, we depict cumulative retirement probabilities over age (Figure 1). The differences of these cumulative retirement probabilities are visible as

the discrepancies between the two cumulative probability functions in each picture. Overall, the pure effect of care on retirement reaches a maximum of approximately 3 percentage points for males, and 1.6 for females at the age of 63.

Figure 1: Cumulative retirement probabilities over age



In general, the age profiles reveal higher probabilities of retirement in case of giving care. Both specifications deliver quite consistent patterns, while confidence intervals for the predictions are greater for males than for females. As an example for males' behavior, the cumulative probability of retirement at age 63 and below is 72.6 percent when giving care and 69.6 percent when not giving care. Therefore, the probability effect of care on retirement is 3 percentage points at this age. For women, this effect is about half in magnitude, 1.6 percent. At the female age of 63, the retirement probability amounts to 83.6 percent for care givers, and to 82 percent for non-care giving. Thus,

care-giving turns out to have a greater impact on men.

6 Conclusions

In this paper we attempted to investigate the effect of care giving on retirement in general and the underlying circumstances in particular. The approach to define care- and support-giving activity was as broad as possible. Two specifications were used to conduct the analysis. It turned out that care activities and the intensity of care play an important role in the decision to retire. Important variations across gender arise in our results. In the single care-dummy specification, significance was achieved in the male sample only, amounting to a crude effect of care and support increasing the probability of retirement by 2 percentage points. Specification 2 decomposed the activities into their dimensions. For males, the intensity of care matters most for their retirement decision; for females, in contrast, giving care outside the own household is the most important determinant.

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