Technical Report: Toward comparative elderly care modeling

First steps on parameterization

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1 Comparative Elderly Care Modeling

Escalating demand for long-term care (LTC) against the backdrop of rapidly aging populations in Asia and Europe poses significant challenges to the sustainability of social protection systems. However, ageing is only one among several dimensions in which considerable transformations are co-occuring, many of which, e.g. fertility decline, the education expansion or changing family structures, are simultaneously affecting care supply and demand. This technical report is part of an effort to design comprehensive analytical tools that keep track of multiple dimensions while providing comparative and forward-looking assessments of LTC-systems and policy responses in the face of upcoming challenges. In particular, we develop a method to obtain parameters on care demand and supply in hours from the harmonized Survey of Health, Ageing and Retirement in Europe (SHARE) to be used as inputs in the dynamic microsimulation model microWELT (www.microwelt.eu).

We proceed along the following steps. First, we adjust SHARE weights to correct for the undercoverage of the nursing home population. Second, we develop a care need assessment algorithm based on an administrative approach from the Austrian universal care allowance system to map characteristics observed in SHARE (ADLs, etc.) to hours. We calibrate this approach against Austrian statistics. Third, we model care needs (any hours) by age, sex and education. Fourth, we model the distribution of hours (those with care needs) by age, sex and education. Fifth, we model institutionalization, the probability of being in a nursing home by age, sex, care needs in hours, having a partner and number of children. Sixth, we model care received, the probability of receiving care given that there is a need by care need (hours), presence of a (caring) partner and having children. Seventh, we model the care mix received, share of total hours of care received from different sources by care need (hours), presence of a (caring) partner and having children. Eighth, we model care giving, the average hours of care provided by age and sex.

The report is structured as follows. Section 1.1 introduces the data source and data adjustments. Section 1.2 discusses our care need assessment algorithm. Finally, Section 1.3 presents five parameterization steps.

1.1 Data

The starting point for our analysis of elderly care is the Survey of Health, Ageing and Retirement in Europe (SHARE). SHARE offers a wealth of data that is harmonized for many EU countries as well as with the US Health and Retirement Study (HRS) and the English Longitudinal Study of Ageing (ELSA). It furthermore covers the relevant dimensions of elderly care for our analysis (care demand and supply) in sufficient detail allowing e.g. to distinguish among different modes of care provision (nursing homes, formal home care, informal home care). To estimate parameters for microsimulation below, we make use of pooled samples drawing on SHARE waves 1 (2004) to 9 (2022), except for wave 3.

While the respondents in nursing homes are not excluded from SHARE, they are not explicitly targeted in the sampling frame and it is well known that the nursing home population tends to be underrepresented due to differential attrition (See e.g. (Barczyk & Kredler, 2019)). Following Banks et al. (2023) and Brugiavini et al. (2023), we therefore recalibrate cross-sectional survey weights from SHARE, which account for attrition and non-response, to match the nursing home population.

For Austria, we obtain the number of people living in nursing homes in 2021 by sex and age from Austrian care services statistics. Since the official age groups do not align with the lower bound of our analysis age window (60-74 vs. 65+), we apply a nonlinear optimization strategy to interpolate the population in the 65-74 age group. Table 1 shows the resulting population proportions which are subsequently used in an iterative proportional fitting algorithm to adjust SHARE survey weights.

Table 1: Austrian population proportions by age, sex and nursing home status (as a share of the total 65+ population in 2021)

	65-74	75-84	85+
In Nursing Home, Female	0.004	0.012	0.022
In Nursing Home, Male	0.003	0.006	0.006
Not in Nursing Home, Female	0.269	0.193	0.063
Not in Nursing Home, Male	0.237	0.148	0.037

1.2 Care need assessment

Modeling demand, supply and eventually the cost of care at the micro level requires the quantification of care in hours. While care hours received can be partially observed in SHARE, care need in hours is not directly available. Yet, SHARE covers many of the most important questions that are frequently used by governments to assess whether the care need of an individual meets the payout criteria of public long-term care insurance programs. The approach we select to quantify individual care need in hours is therefore to subject SHARE respondents to a standardized care need assessment based on the Austrian care allowance system.

Austria provides a universal care allowance system designed to support individuals who require regular assistance due to physical, mental, or psychological impairments (Famira-Mühlberger & Österle, 2024; Trukeschitz et al., 2022). The system operates on a tiered structure, in which recipients are assessed and granted an allowance based on their level of dependency, categorized across seven different levels (ranging from a minimum care need of 65 hours per month in level 1 to 180+ hours in levels 5-7). Payments are determined by the degree of care required rather than the recipient's income, ensuring that the support is targeted toward the individual's specific needs. This allowance can be used to cover various services, including in-home care, professional care services, or assistance from family members. The system aims to improve the quality of life for the elderly, allowing them to maintain independence for as long as possible while securing the necessary care and support.

The care need assessment required before being placed in the care allowance system is done by trained and qualified experts (doctors or nurses) (Trukeschitz et al., 2022). This assessment follows the rules and guidelines defined in the Federal Care Allowance Act, the classification regulation[1], the directive for the uniform application[2] of the Federal Care Allowance Act and the Consensus paper "A working document for assessors for the uniform medical and nursing assessment in

[1] https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10009142
[2] https://www.ris.bka.gv.at/Dokumente/Avsv/AVSV_2012_0084/AVSV_2012_0084.pdfsig

accordance with the Federal Care Allowance Act". For the purpose of this technical report, we implement a simplified version of the Austrian care need assessment for SHARE respondents based on these documents.

Table 2 below shows this simplified care need assessment scheme, mostly based on questions regarding limitations in Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). The official assessment scheme also provides hours for motivational dialogue to support people with mental health limitations in their independence in coping with everyday life. We proxy the need for motivational dialogue by IADL questions related to cognitive status. Furthermore, we proxy the hardship supplement provision for severe mental health limitations by questions capturing whether respondents have been diagnosed with severe mental illness such as dementia or psychiatric problems by a doctor.

In developing our simplified care need assessment scheme and contrasting it with the Austrian care statistics, we noted that too few people were assigned hours based on (I)ADLs alone and that too few hours were assigned. At the same time, the official assessment scheme provides assessors some flexibility to assign more or also fewer hours for specific limitations if there are substantial deviations from the default values. Moreover, health-related attrition (Muszyńska-Spielauer & Spielauer, 2022) and under-reporting of limitations in SHARE may also contribute to the under-assignment of hours. We therefore decided to assign additional hours based on two approaches. First, we allocate bonus hours to respondents with limitations on an additional battery of functional limitation questions included in SHARE. Second, we include a quadratic age term in the allocation scheme that captures unobserved factors driving the strong increase in care need that occurs around age 80. This polynomial is calibrated to approximate three alignment targets based on Austrian care allowance statistics for 2021. We target the population share with 65+ assigned hours of care need (entry threshold of the Austrian system), and the distributions of hours observed in the Austrian population conditional on age and sex, both for the binary prevalence of 65+ hours of care need as well as the average number of hours (see further discussion below). Furthermore, the conditional age trend is assigned only to individuals who report limitations on any of the other indicators used in the algorithm or, in addition, who report any limitation on the General Activity Limitation Indicator (GALI). Thus, we do not assign needed care hours to individuals who, based on a broad set of indicators, remain healthy and without limitations throughout their lives.

Since not all variables used in our care need assessment scheme are consistently available across all waves, we resort to imputations and proxies in a limited number of cases. First, the IADL questions on difficulties with "leaving the home independently" and with "doing the laundry" are only available in waves 6-9. We therefore impute these variables in waves 1-5 using a logit model that draws on (I)ADLs and additional functional limitation questions available in all waves to predict the individuals most likely to have these additional limitations. Second, information on dementia and psychiatric conditions is not directly available in wave 1. Regarding dementia, we again use a logit model to impute likely candidates in wave 1 using as covariates IADL questions related to cognitive limitations as well as questions that assess an individual's orientation with respect to the current date. Finally, we proxy psychiatric problems in wave 1 by utilizing a question on whether respondents take drugs against anxiety or depression at least once a week, which identifies a similar (and also very small) share of respondents compared to the diagnosed psychiatric condition variables used in other waves.

In the end, the individual monthly hours of care needed are obtained by summing over all conditions that are met. In principle, this scheme can be applied to all SHARE countries to obtain care need in hours. The basic assumptions for comparative analysis would be that respondents across countries tend to provide similar answers to the relevant questions based on their limitations and that the care need that corresponds to a given limitation is the same across countries.

Table 2: Simplified Austrian Care Need Assessment Scheme related to SHARE variables

Limitation	Monthly Hours
ADLs	
Dressing	20
Walking AND getting up	30
Walking AND NOT getting up	15
NOT Walking AND getting up	22.5
Daily hygiene and bathing	35
Eating	30
Using the toilet	30
IADLs	
Preparing a hot meal	30
Shopping	10
Taking medication	3
House or garden work	10
Leaving home independently	10
Laundry	10
Motivational talk (Using a map OR Telephone calls OR Managing money)	10
OTHER	
Dementia	45
Psychiatric problem	45
Extra hours 1 (Climbing several flights of stairs without resting OR Stooping, kneeling, or crouching OR Reaching or extending your arms above shoulder level OR Pulling or pushing large objects like a living room chair OR Lifting or carrying weights over 10 pounds/5 kilos, like a heavy bag of groceries)	5
Extra hours 2 (Walking 100 metres OR Sitting for about two hours OR Getting up from a chair after sitting for long periods OR Climbing one flight of stairs without resting OR Picking up a small coin from a table)	10
CONDITIONAL AGE TREND (if any condition OR GALI)	
	$(age - 65) * 0.73$
	$(age - 65)^2 * 0.042$

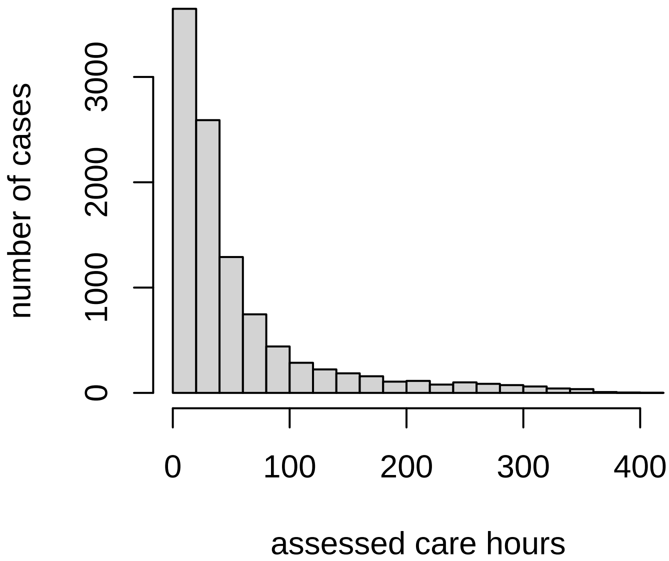

Figure 1: Histogram of assigned monthly care hours for AT SHARE respondents

Figure 1 shows a histogram with the monthly care hours our scheme assigns to AT SHARE respondents. As discussed above, we calibrate (and assess the plausibility of) this allocation using Austrian care allowance statistics. Our first alignment target is the population share with 65+ assigned hours, which is the threshold to be placed in level 1 of the Austrian care allowance system. In 2021, the share with 65+ monthly care hours (level 1 or higher) in the population of age 65+ is about 20 percent. Our current scheme assigns 65+ hours to 17.48 percent of our sample corresponding to a weighted population share of 19.49 percent.

The second alignment target used for calibrating our assessment scheme is the conditional distribution of needing 65+ hours of care by age and sex. Figure 2 below shows the prevalence of receiving care allowance by age and sex in black, which is equivalent to a care need of 65 hours or more. The green line applies locally estimated scatterplot smoothing (LOESS) to weighted shares of survey respondents with 65+ assessed hours by age in years and sex.

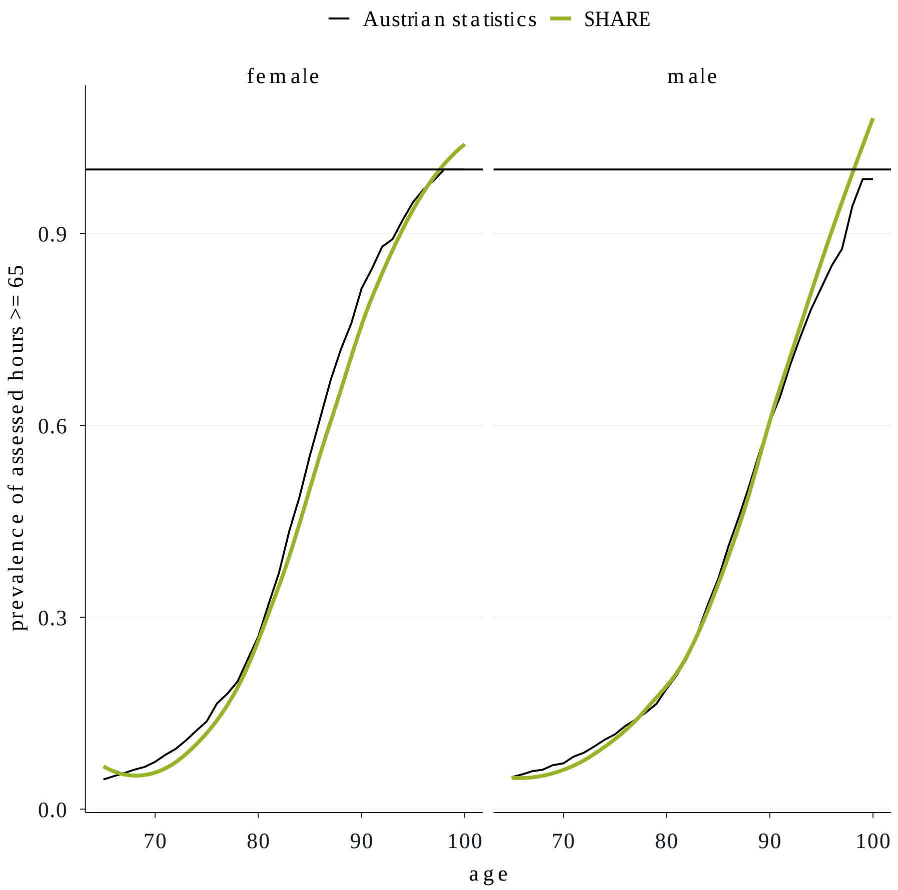

Figure 2: Prevalence of assessed monthly care need larger or equal to 65 hours by age and sex. We apply locally estimated scatterplot smoothing (LOESS) to weighted shares of survey respondents with 65+ assessed hours by age in years and sex. The black line provides a comparison with Austrian administrative data on care allowance prevalence of level 1 or higher, which is equivalent to a care need of 65 hours or more.

Lastly, we align our assessment scheme to the conditional distribution of average hours of care need by age and sex. We obtain monthly average hours from Austrian care allowance statistics by multiplying the prevalence of each care allowance level by its allotted minimum monthly care hours. The black line in Figure **??** below represents the results. In order to facilitate a meaningful comparison with our assessed hours, we restrict the sample to individuals with assessed hours above 65 and decrease individual care hours to the threshold applicable to each respondent. We then calculate averages of minimum monthly assessed hours by age and sex (green line). The results indicate that we may assign too few hours to women at the lower and upper ends of the age range and too many hours to men at the lower end. However, we need to caution that deviations at the boundaries of the age range may also be related to sample size limitations. Furthermore, the higher average hours for men at the lower end of the age range may also be indicative of lower take up of care allowance in this group, as, in some cases, care work for these men may be provided informally by their partners and without applying for care allowance.

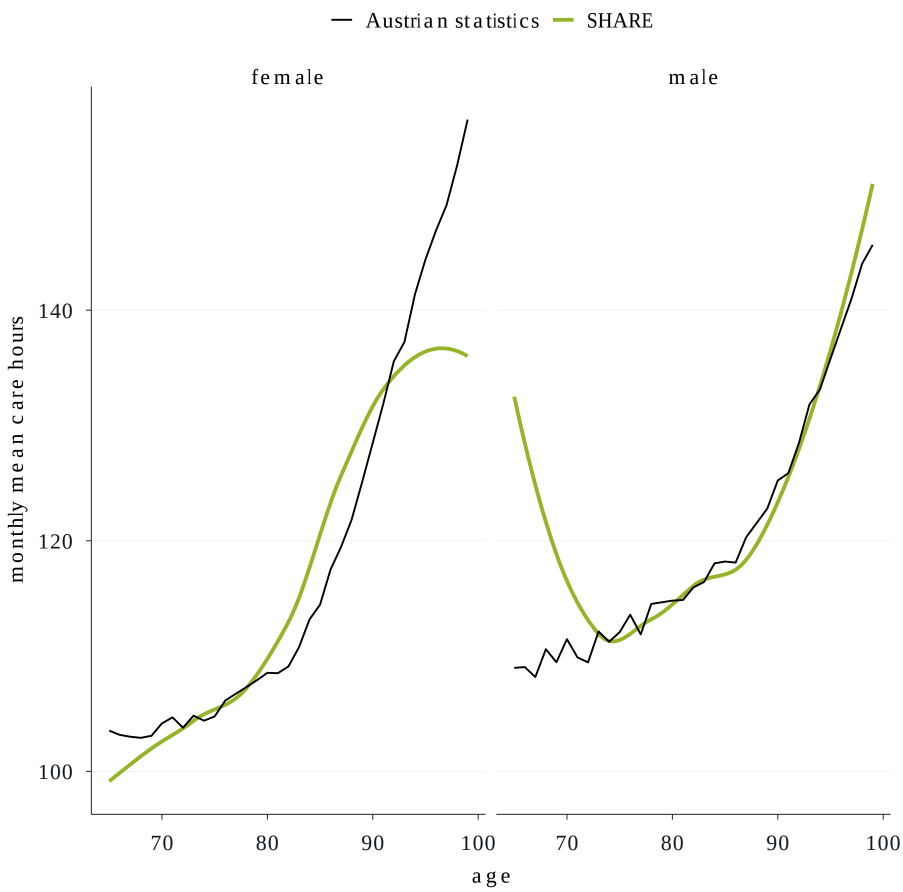

Figure 3: Average assigned hours for those with 65+ hours of care need by age and sex (weighted). Comparison of assessed hours with average hours from Austrian statistics (black line) calculated by multiplying the minimum hours per care allowance level times its prevalence. Subsample: respondents with 65+ hours of care need. Comparability with Austrian statistics is enhanced by assigning each assessed value of monthly hours into a care allowance level before calculating weighted averages and applying LOESS.

1.3 Parameters

1.3.1 Step 1: Any care need

In a first step, we obtain estimates for the probability of needing care by age (in years), sex and education (three levels).[3] This is achieved by fitting weighted shape constrained additive models within subgroups to the dummy dependent variable of having positive assessed hours of care need, using monotone increasing P-splines to estimate smooth functions. We impose that the prevalence of having any care need is increasing with age and that with age 100 everybody will need any hours of care because of data sparsity at the upper end of the age range. Figure 4 below shows

[3] Regarding education, we group ISCED 1997 levels into the categories low (0,1,2), medium (3,4) and high (5,6).

the resulting predicted probabilities of having any care need. These probabilities are directly used as input parameters in the microsimulation model. The figure shows the expected strong rise in the probability of having any care need with age across all groups. The less educated group has a somewhat higher chance of needing care over the entire age span.

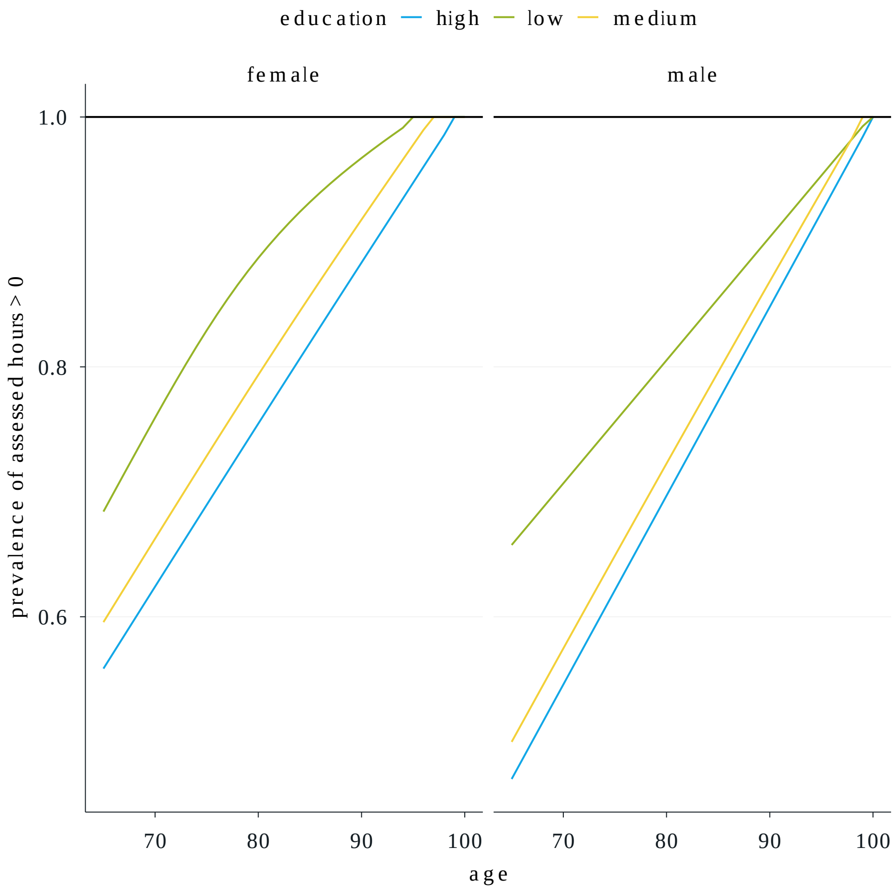

Figure 4: Prevalence of positive assessed monthly care need by age, sex, education (weighted). We use monotone increasing P-splines to estimate smooth functions and impose that everyone has positive care need at age 100 to counteract data sparsity at the upper end of the age range.

1.3.2 Step 2: Care need in hours

To obtain estimates for care need in hours by age, sex and education, we restrict the analysis to the subsample with positive assessed hours. In our regression specification, we use assessed monthly hours as dependent variable. As independent variables, we include age, sex and education as well as interaction terms between age and sex as well as age and education. Since we are not only interested in average hours by age, sex and education but also in their distribution, we estimate quantile regressions at decile cutoff values. The regression results can be seen in Appendix Table 3. Subsequently, we calculate decile means for the assessed monthly hours of care need. Due to the linear model specification, we encounter a limited number of negative predicted hours at low ages which we set to zero. Since this concerns only care needs close to zero hours and since the linear specification delivers more comparable and realistic results across countries (observations with high education are limited e.g. in Italy and Spain) we refrain from using non-linear specifications. Figure 5 below shows the resulting decile means of assessed monthly hours of care need by age, sex and education which we use as input parameters for microsimulation. The results appear intuitive, i.e. education does not only impact the probability of needing care, but the monthly care need in hours also tends to be lower for more educated individuals.

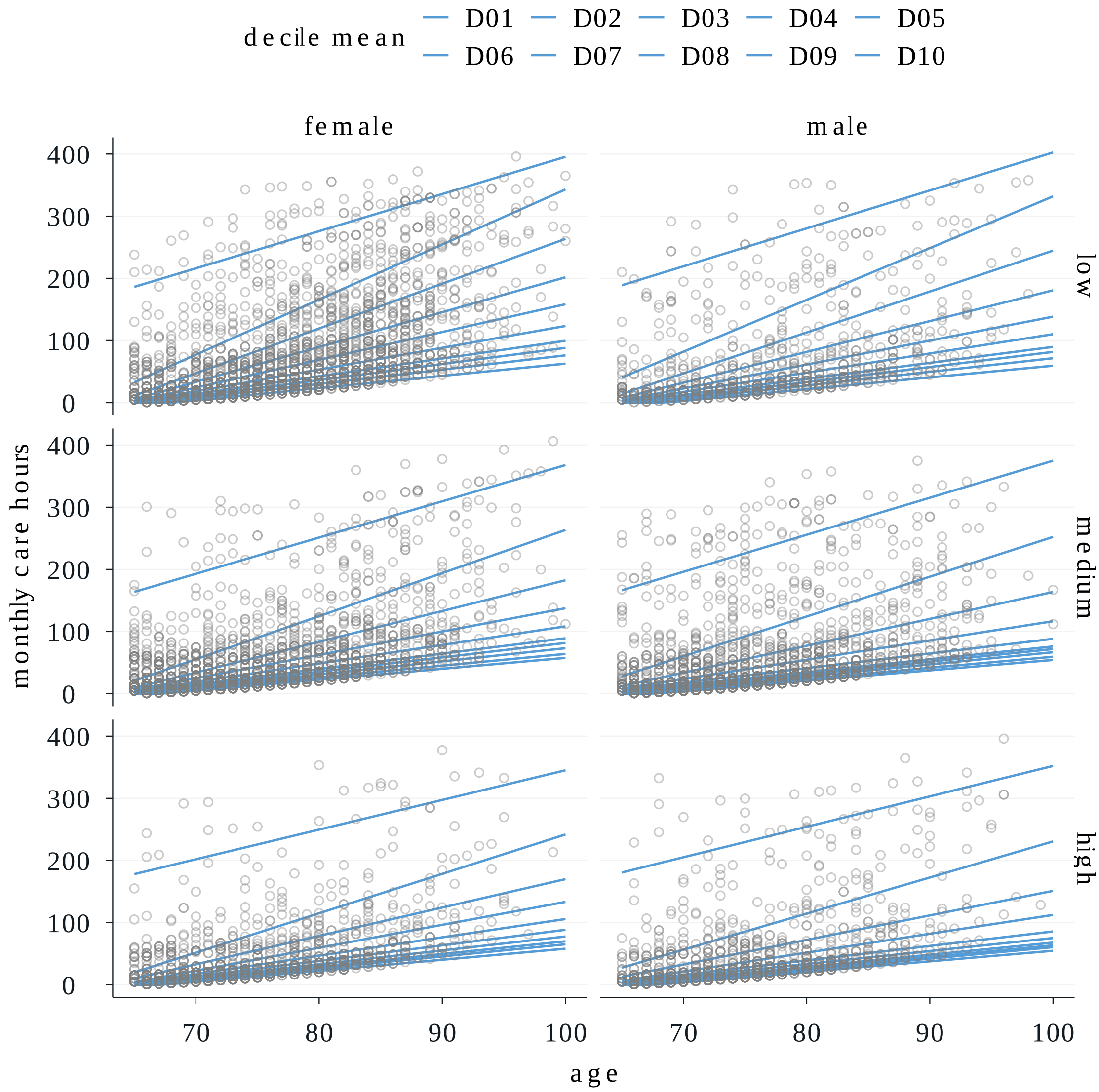

Figure 5: Distribution of care need in hours by age, sex, education (weighted). Subsample: respondents with positive care need. Decile means computed from predictions of quantile regressions. As independent variables, we include age, sex and education as well as interaction terms between age and sex as well as age and education.

1.3.3 Step 3: Nursing Home care

We next turn to the question of who will be sent to nursing homes. To facilitate comparability of survey questions in SHARE with Austrian care service statistics, we construct a broadly defined nursing home dummy that encompasses nursing homes and residential homes. Depending on the nursing home definitions in other countries, this indicator could also be narrowed down. Cross-country differences in definitions of what legally counts as a nursing home should ideally be considered and harmonized in our comparative analysis. In the third step of our analysis for Austria, the nursing home indicator is the dependent variable in a logistic regression that controls for age, sex, assessed hours of care need and whether an individual's partner is not living in the household. The previous terms are allowed to vary by sex via an interaction term and we also add a separate categorical variable for the number of children.

In Figure 6 below, we compare the predictions of nursing home status from our model to Austrian care service statistics. We plot smoothed (LOESS) trend lines through average predicted nursing home probabilities by age and sex (in blue) against the nursing home prevalence from official statistics (in black). The Figure indicates that our model tends to capture the nursing home probability of women quite well on average. For men, we somewhat overestimate the nursing home probability for over 90-year-olds (note that only few observations are available in our SHARE sample for men in that age range, n = 100).

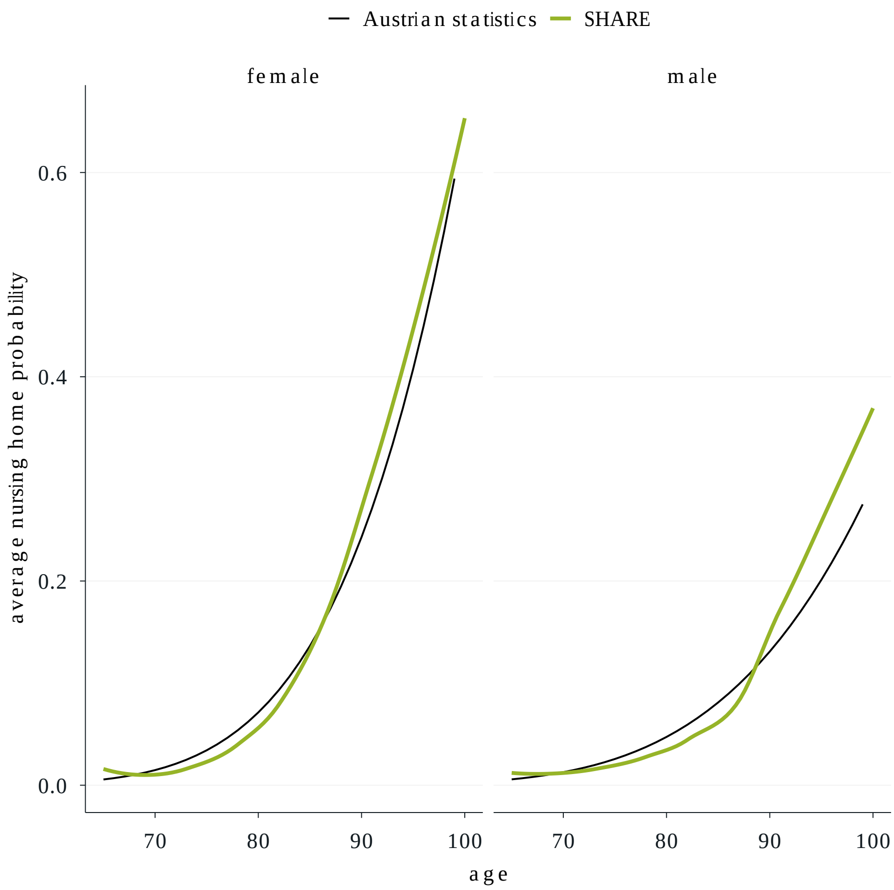

Figure 6: Nursing home prevalence in Austria. The nursing home indicator is the dependent variable in a weighted logistic regression that controls for age, sex, assessed hours of care need and whether an individual's partner is not living in the household. The previous terms are allowed to vary by sex via an interaction term and we also add a separate categorical variable for the number of children. We plot smoothed (LOESS) trend lines through average predicted nursing home probabilities by age and sex against the nursing home prevalence from Austrian care service statistics (black line).

Figure 7 shows the predicted nursing home probabilities that are used as parameters to assign nursing home status in the microsimulation model, by age, sex, care need, presence of a partner and number of children. The Figure confirms the expectation that the model consistently assigns higher nursing home probabilities to individuals with higher care need and no partner in the household. Furthermore, we observe only a minor effect of having one child whereas having two or more children seems to considerably reduce the probability of being in a nursing home.

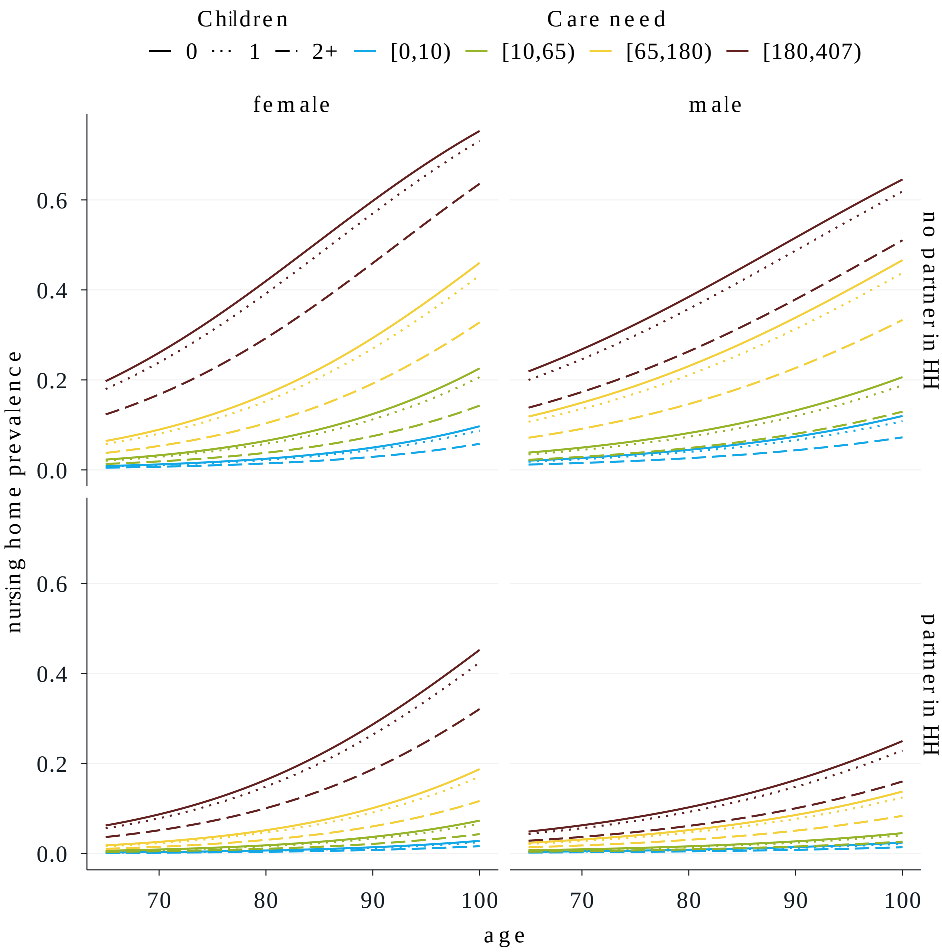

Figure 7: Nursing home prevalence by age, sex, hours needed, partner, and children. The nursing home indicator is the dependent variable in a weighted logistic regression that controls for age, sex, assessed hours of care need and whether an individual's partner is not living in the household. The previous terms are allowed to vary by sex via an interaction term and we also add a separate categorical variable for the number of children.

1.3.4 Step 4: Home Care

The aim of this step is to determine the probability of receiving any type of care and the average care mix among care recipients, according to family characteristics and care needs in hours. We distinguish between care provided by a partner, informal care provided by others, formal care services and a care gap. Regarding family characteristics, we distinguish people by partnership status (having a partner able to provide care / not having such a partner) and children (no children, children). People without care needs (assessed hours equal to zero) are removed from the sample at this step.

Since home care is not measured consistently across all waves in SHARE, we further restrict the sample and rely on multiple assumptions and imputations. The ultimate goal of our analysis is to identify care gaps. We thus select SHARE waves 1, 2, 6, 7, 8 and 9 as these waves contain questions on whether individuals receive help with ADLs and whether this help is sufficient.

Formal home care (FHC) is measured by specific questions in SHARE. Waves 1, 2, 7, 8 and 9 include questions on how many weeks in a year personal care, domestic help, or meals-on-wheels, were received, respectively. For personal care and domestic help there is an additional question on the average number of hours received per week. We compute average monthly hours received for each care type. For meals-on-wheels, we assume 7 hours per week in line with the number of hours provided for food preparation in the Austrian care allowance system. Adding together the average hours for the different care types, we obtain the average monthly hours of formal home care received. Outliers receiving above 720 hours per month are capped (only applies to few cases). In wave 6, SHARE only contains dummy variables on whether personal care, domestic help, or meals-on-wheels were received. For respondents in wave 6, we thus assign average hours received for the respective care type, as computed from the other waves.

Hours of outside informal care (OIC) can also be obtained in SHARE. The relevant question asks respondents whether they receive help with (I)ADL related tasks from outside of the household and from whom. Three helpers are identified and for each of these helpers the frequency of help is established (daily, weekly, monthly, yearly). In waves 1 and 2 there are also additional questions asking for the number of hours provided for each interval. We calculate average hours received for each interval in waves 1 and 2 and assign them to individuals in waves 6-9 who receive help in the respective intervals. Total monthly average hours of outside informal care received are then calculated by adding up hours across helpers and outliers are again capped at 720 hours per month.

A large share of home care is usually provided by partners or other household members. However, SHARE does not capture help within the household in detail. The related question only asks whether one receives intensive (daily or almost daily) care from another household member. To complete the home care mix, we therefore estimate hours of care received from partners and household members.

The approach we choose to obtain care hours within the household amounts to the assumption that partners and other household members cover any residual hours of care needed. To calculate the individual care mix and whether there is any care gap, we draw on the information available in SHARE and construct a large decision tree (see Figure 8 below). We first split the sample according to the type of information available in SHARE on care received. About one third of respondents report to receive help with ADLs (question ph050) and for whom we thus have self-reported gap information (ph051). We label this group ”care received: full info”. Then there are about 20 percent of respondents who say that they do not get help with ADLs at the respective question, but report that they get ADL related FHC or OIC on other questions (care received: limited info). Furthermore, almost half of the respondents say that they receive none of these types of care. We next determine whether each individual has a partner in the household and whether the partner is able to provide care. The latter is given if the partner is not in a nursing home and has an assessed care need of below 180 hours. Care provided by other persons living in the household is treated as informal care provided by others (outside the household), because we only model nuclear families. In cases where there is no partner able to provide care, additional household members are assumed to cover any shortfall, so we assume that there is no care gap in these cases. Next, respondents may receive formal home care, outside informal care or both. Finally, we determine whether there is a gap or not. For this purpose we subtract any hours received from the individual hours needed. We assume that there is no gap if a caring partner or other household member is present who takes any and all remaining hours. For respondents without caring partner or other HH member, we make use of the self reported gap information. In case no gap is reported, any remaining hours are allocated to OIC, if both OIC and FHC are received, or to either FHC or OIC, if only one of both is received. In the end, we obtain the individual care mix, and whether there is a full or partial gap between care hours received and needed. Figure 8 below provides further detail and shows only the branches of the tree for which data is available.

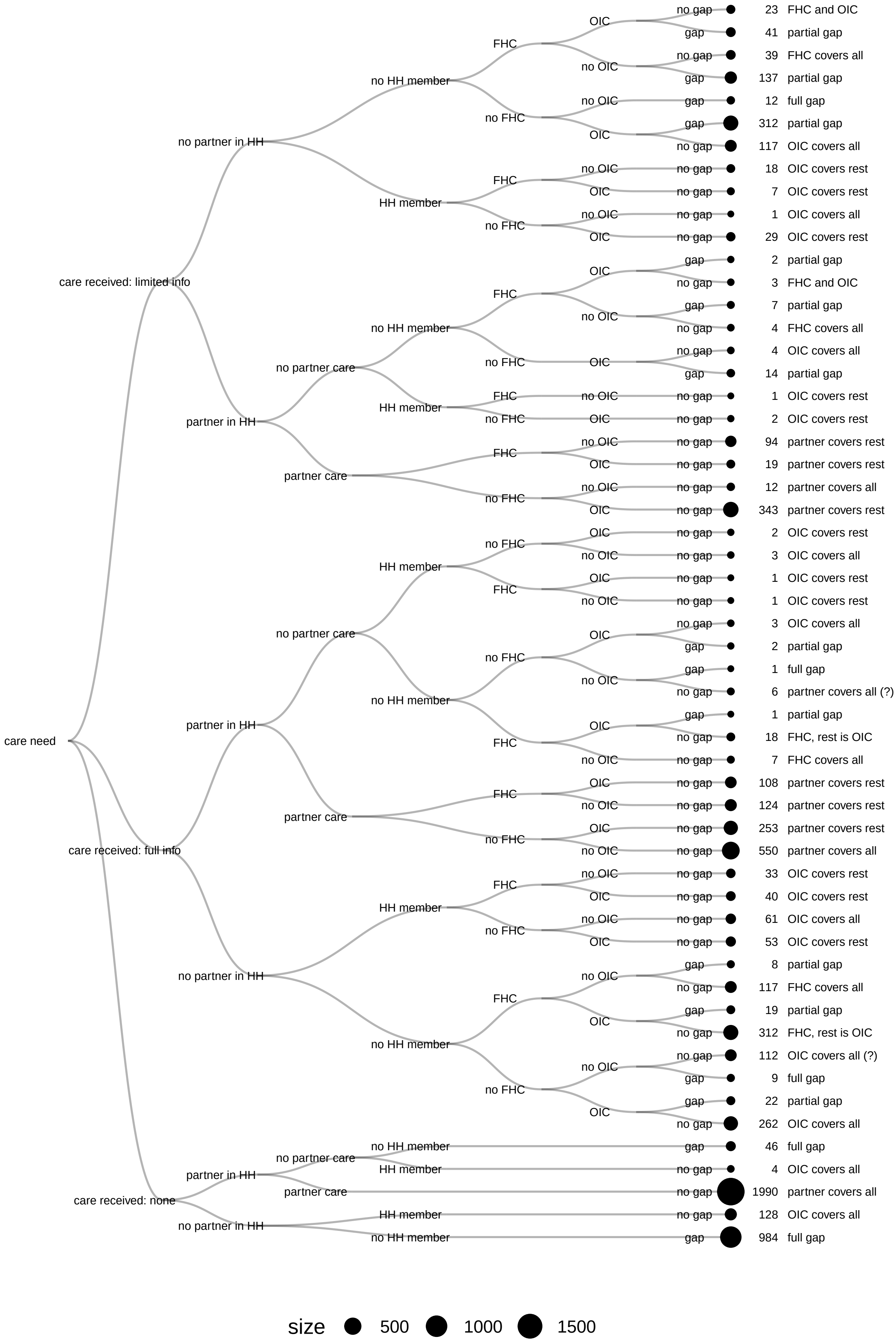

Figure 8: Illustration of our approach to obtain the individual care mix in hours from SHARE to be used as input for parameter estimation.

Having obtained the individual care mix in the sample with positive care need, we next estimate the parameters for microsimulation. We start with the probability of receiving any care. Figure 9 shows predicted care receipt probabilities from a logit model interacting the covariates assessed care need, partner and children. The results show that, as a consequence of our assumptions, virtually all people with partners in their household receive care and only few partners are classified as unable to care. For people with partners, we do not make use of these estimates as parameters, since we can determine a partner's ability to care from assessed care hours in the model. For people without partners in their household, on the other hand, we observe that there is a substantial chance of not receiving care, especially at lower levels of care need. Furthermore, having children improves the chances of receiving care. The estimates of care receipt probabilities for people without partners are used as parameters in the microsimulation model.

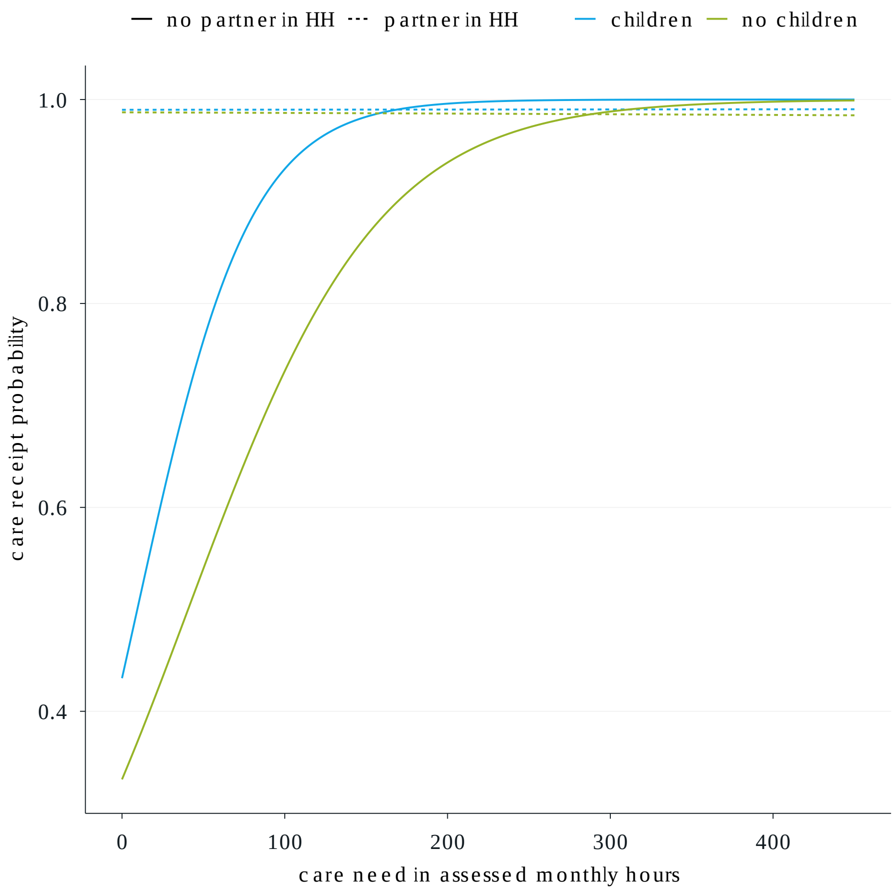

Figure 9: Care receipt probability within the care need sample by assessed care hours, presence of a caring partner and number of children (weighted).

In the next step, we calculate the average care mix across groups of care recipients depending on their care need, the presence of a caring partner and whether they have children.[4] For this

[4]We refrain from modeling this step at the individual level due to sample size limitations.

purpose, we compute the share of total hours received for each care type within each group. Since we have previously capped care hours received at care hours needed for our care receipt estimation procedure, we add back ”excess” hours received at the individual level before calculating shares of total hours. This is necessary to avoid introducing gaps by our procedure and to maintain consistency with the imputation of average hours to missing observations. Figure 10 shows the resulting care mix for each group. We note that the share of formal home care rises with needed care hours. Furthermore, having children increases the share of outside informal care across all groups. For those with a partner able to provide care, the share of partner care declines with increasing care need, except for very low levels of care need. On the other hand, people without partners able to care tend to experience the largest gaps at intermediate levels of care need.

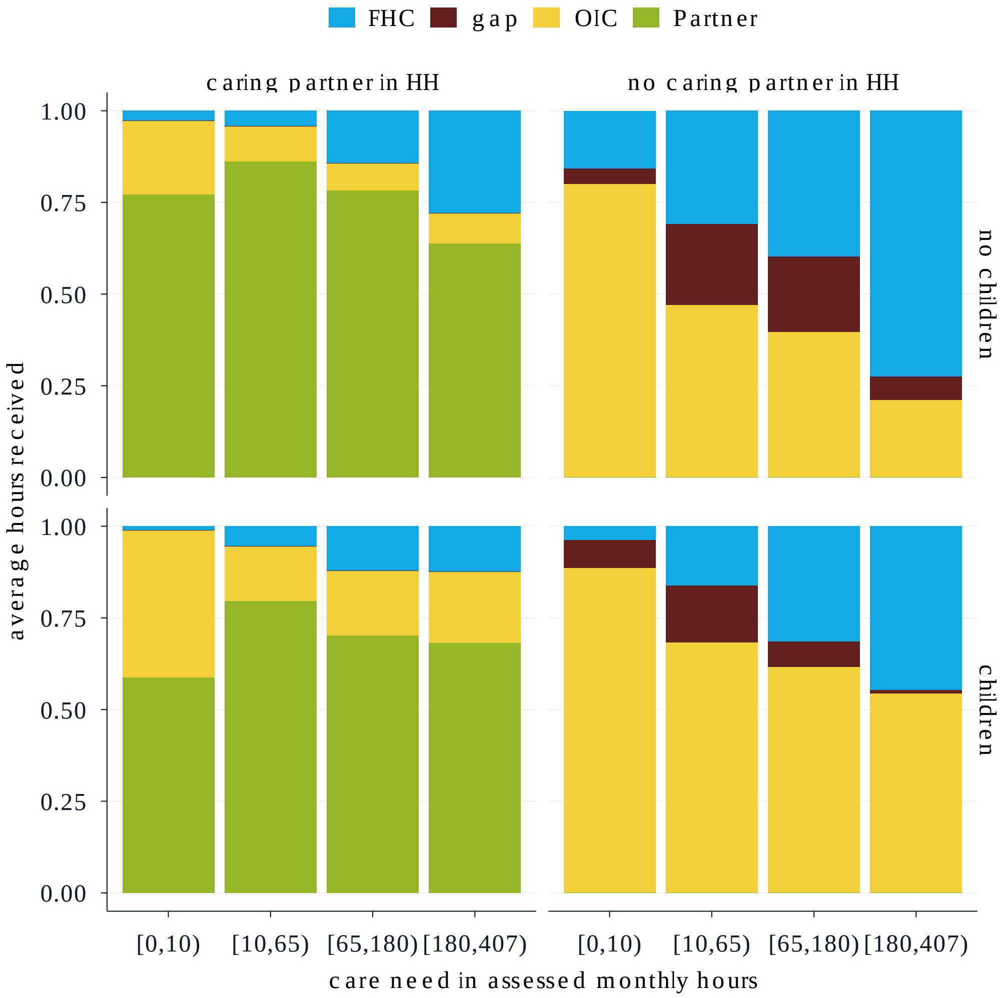

Figure 10: Care mix in Austria by grouped assessed care hours, presence of a caring partner and having children (weighted).

1.3.5 Step 5: Care giving

In step 5, we obtain parameters on average hours of care provided informally to adults outside the household by age and sex. The results from this step are preliminary in the sense that they provide required inputs for the microsimulation model but should be taken with a grain of salt due to data limitations. Consistent with the previous steps, we continue to use SHARE data, because this survey essentially contains the information needed for this step. However, SHARE targets the population aged 50 years and above while containing only limited and unrepresentative information for under 50-year-olds. Since better comparative data sources for Austria are not easily available for this step, we proceed with SHARE data as most informal care giving to adults is likely to occur above age 50. We obtain a reasonable age shape (50+) but breakdowns by characteristics beyond sex (e.g. labor force participation) could furthermore not be derived due to data limitations. Alternative data sources should therefore be explored to extend and refine this step.

The questions asking SHARE respondents about informal care giving outside the household closely resemble the questions on received outside informal care we used at the previous step. Respondents report whether they have given help with (I)ADL related tasks to a family member from outside the household, a friend or neighbor (and to whom). Three persons receiving help are identified and for each of these the frequency of help is established (daily, weekly, monthly, yearly). In waves 1 and 2 there are also additional questions asking for the number of hours provided for each interval. We again calculate average hours given for each interval in waves 1 and 2 and assign them to individuals in waves 4-9 who provide help in the respective intervals. Total monthly average hours of outside informal care given are then calculated by adding up hours across helpers and outliers are again capped at 720 hours per month.

Figure 11 below shows average hours of care given by age and sex used as parameters for the microsimulation model. Please note that we estimate hours of care given only for the population aged 50 years and older. The curves between 50 and 100 years are again obtained by applying statistical smoothing techniques and we impose that people at age 100 provide no hours of care. We observe that average monthly care hours given for women and men peak at age 60 and at around 13 and 7 hours respectively.

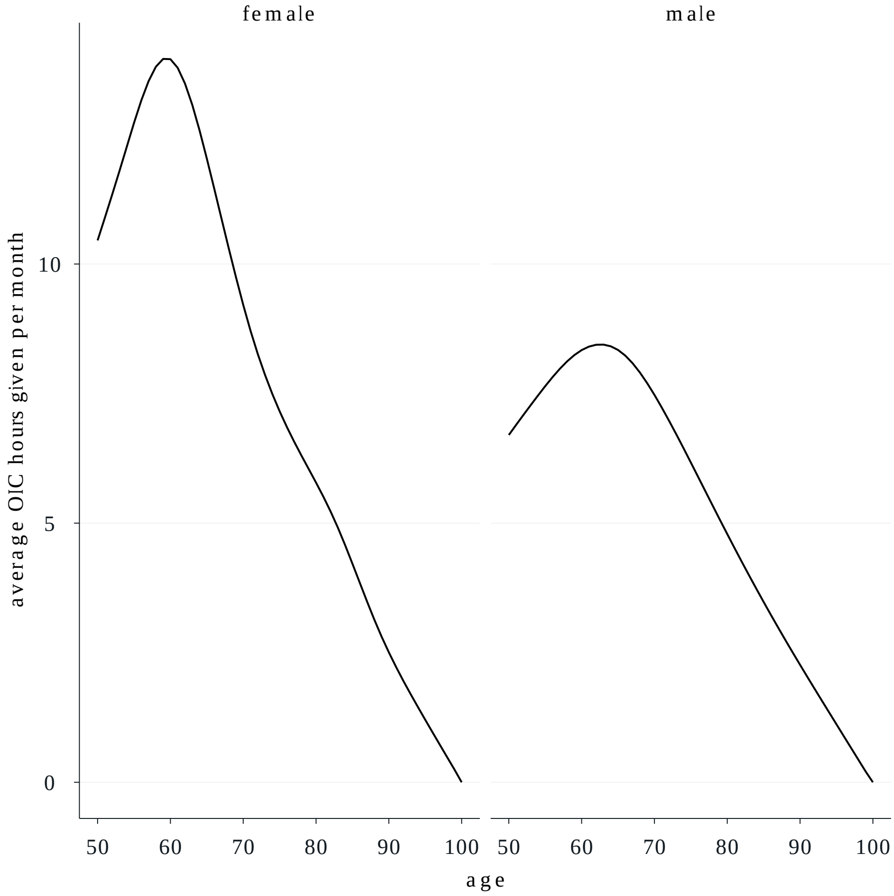

Figure 11: Average hours of care given by age and sex (weighted).

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A Additional Results

A.1 Step 2

Table 3: Quantile regressions, dependent variable: assigned hours of care need, weighted

	Q0	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90	Q100
Constant	−128.804***	−139.534***	−168.809***	−174.109***	−197.334***	−257.335***	−320.780***	−397.487***	−516.921***	−569.339***	164.632***
	(0.000)	(5.304)	(4.666)	(10.086)	(13.105)	(13.732)	(16.249)	(25.115)	(30.754)	(29.513)	(49.418)
Age	1.864***	2.074***	2.531***	2.661***	3.044***	3.969***	4.980***	6.236***	8.177***	9.547***	2.410***
	(0.000)	(0.071)	(0.064)	(0.139)	(0.181)	(0.193)	(0.233)	(0.364)	(0.446)	(0.374)	(0.622)
Male	0.000***	10.135	2.172	18.122**	18.699*	36.815***	47.805***	41.395*	45.227	39.137	−50.068
	(0.000)	(5.856)	(3.977)	(5.902)	(8.174)	(7.319)	(12.155)	(17.997)	(36.252)	(47.453)	(58.318)
Educ Medium	19.404***	12.720*	45.551***	19.677*	51.932***	86.154***	112.775***	129.587***	159.961***	66.646	−92.826
	(0.000)	(5.357)	(5.545)	(9.855)	(12.786)	(13.974)	(16.185)	(27.008)	(39.001)	(50.905)	(59.859)
Educ High	19.404***	8.910	39.869***	33.023***	46.423***	85.763***	114.002***	132.648***	207.831***	94.424	45.662
	(0.000)	(7.403)	(5.976)	(9.883)	(13.490)	(14.375)	(19.954)	(28.530)	(46.544)	(67.547)	(135.435)
Age * Male	−0.000***	−0.169*	−0.047	−0.286***	−0.279*	−0.540***	−0.707***	−0.604*	−0.640	−0.428	0.677
	(0.000)	(0.084)	(0.054)	(0.084)	(0.116)	(0.105)	(0.176)	(0.261)	(0.516)	(0.670)	(0.764)
Age * Educ Medium	−0.252***	−0.172*	−0.653***	−0.298*	−0.775***	−1.288***	−1.703***	−2.003***	−2.511***	−1.348	1.059
	(0.000)	(0.071)	(0.076)	(0.137)	(0.177)	(0.197)	(0.234)	(0.392)	(0.567)	(0.710)	(0.765)
Age * Educ High	−0.252***	−0.126	−0.582***	−0.511***	−0.721***	−1.299***	−1.750***	−2.083***	−3.191***	−1.856	−0.552
	(0.000)	(0.100)	(0.082)	(0.137)	(0.185)	(0.202)	(0.288)	(0.416)	(0.668)	(0.952)	(1.669)
Num. obs.	10150	10150	10150	10150	10150	10150	10150	10150	10150	10150	10150
Percentile	0.000	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900	1.000

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.
SHARE waves 2,4-8