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ABSTRACT

This paper uses data from the Survey of Health, Ageing and Retirement in Europe to examine the home care received by elderly in Western Europe. Specifically, we relate the demand for home care to the health status of the elderly household members and like previous studies find that health limitations, age, and marital status are important determinants of home care. New findings come from a detailed analysis of the relative demand from different potential home care providers (children, other relatives, friends and the state). The results reveal that relatives and friends provide as much home care as children and that the relative importance of the different home care providers changes with household characteristics like age and total health care demand. Furthermore, the results show that friends act as a substitute for informal care from adult children.

Key words: Informal care; System of equations; Aging

JEL Classification: I38; J12; J14

I. Introduction

In Europe, the proportion of those 65 or older is currently around 17 percent but will rise to about 30 percent by 2050 (Eurostat, 2008). Such aging of the European population, the result of declining mortality and fertility rates over the last century, has raised concerns about the social cohesion and sustainability of the welfare state (Hantrais, 1999; Lee 2003). One consequence of an aging population is an increase in the (total) demand for home care owing to the limitations that elderly people experience in daily activities and the help they need for basic tasks like house cleaning and personal care (Comas-Herrera et al., 2006; Pickard et al., 2007). Such home care for the elderly may be provided by informal caregivers like family or friends or by formal care providers like professional home care institutions, often part of the welfare system, which we refer to as "state providers." Public policymakers concerned with the projected increase in the demand for home care need insights into the extent to which informal providers can meet the demand for home care and may alleviate the demand for state-provided home care.

To this end, we examine the composition and determinants of home care received by the elderly in Western Europe.[1] Whereas earlier research indicates that the demand for home care by persons outside the household is determined by health limitations and marital status (see, e.g., Stern, 1995; Pezzin and Steinberg-Shone, 1999; Hoerger et al., 1996; van Houtven and Norton, 2004), such studies usually define informal care as the

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1. Previous papers have been concerned with related issues such as financial transfers from children to parents (e.g., Couch, Daly, and Wolf, 1999), the direct relationship between informal and formal care (see, e.g., Pezzin et al., 1996; Charles and Sevak, 2005; Viitanen, 2007; Bolin et al., 2008b), the relationship between female labour supply and care (e.g. Ettner, 1995, Wolf and Soldo, 1994) and the projected future care gap (e.g., Pickard, 2008); however, such analyses are not an aim of this paper.

home care provided by (adult) children only. For instance, Pezzin and Steinberg-Shone (1999) find that parental health status has a large significant effect on a daughter's informal care provision, while Stern (1995), using U.S. data, shows that the distance children live from their parents has a large effect on home care provision. This latter finding is confirmed for European data by, for example, Bonsang (2008). Nonetheless, Lakdawalla and Philipson (2002) argue the importance of informal care from people other than adult children; for instance, a partner or friends. Using county level data for the U.S., they show that male (relative to female) mortality has a strong negative relationship with the number of residents in nursing homes, an observation explained by the univerally recognized fact that on average women live longer than men. Improving men's life expectancy would translate into a shorter period of widowhood for wives and a longer period during which the spouses could take care of each other, which in turn would reduce the need for state-provided care. They relate their finding to the well-documented compression of morbidity hypothesis (Fries, 1980), which assumes a biological upper bound to the human life span that makes it possible to increase the age of first infirmity and thus reduce the period of disability.[2] Lakdawalla and Philipson (2002) then make the more general claim that a reduction in disability rates among the elderly could expand the nonmarket supply for home care because an elderly person with no demand for home care may in fact become a supplier of informal care. Nonetheless, they point out, this claim rests on the assumption that the elderly spouses will care for

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2 There is an ongoing discussion in the public health literature on both the validity of Fries' hypothesis and its implications for resource allocation to different health care programs (see Mackenbach et al., 2008, for a critical review of this discussion).

each other, an assumption for whose validity they provide evidence, as do both Stern (1995) and Bonsang (2008). As regards other elderly like friends and neighbors, however, there is, as far as we know, no empirical evidence. Hence, this paper contributes to the empirical home care literature by conducting a detailed examination of the role of potential informal caregivers other than spouses and adult children, including friends, neighbors, and relatives. Specifically, this analysis based on household level data provides a picture of both informal home care to the elderly by all potential informal caregivers and the interaction between informal and state provided home care.

We estimate our model of the total demand for home care by the elderly and its allocation among all potential informal (children, other relatives, friends and neighbors) and formal (state) caregivers using data from the Survey of Health, Ageing and Retirement in Europe (SHARE). An important advantage is that these data contain detailed information on the hours of home care provided by the different caregivers. In line with the extant literature, we find that (instrumental) limtations in daily living activities, mobility, and general activity are important determinants of total home care. Our primary empirical results strongly support Lakdawalla and Philipson's (2002) claim that friends and relatives other than adult children are major providers of informal home care. These latter not only provide as much home care as children, but friends particularly act as a substitute for the informal care provided by adult children. Thus, a reduction in home care provision by children results in increased provision by friends and, to a much lesser extent, in state-provided home care.

The rest of the paper is organized as follows: Section II describes the data; Section III discusses the theoretical framework and outlines the empirical model and

estimation procedure. Section IV presents the results, and Section V summarizes the findings and concludes the paper.

II. Data

We use data from the first wave (2004) of the Survey of Health, Ageing, and Retirement in Europe (SHARE), a multidisciplinary cross-sectional survey of the European population aged 50 and over.[3] Although the raw data cover about 19,000 households, this analysis focuses only on elderly households; therefore, we select single persons aged 65 or over and married (or cohabiting) couples of whom at least one is aged 65 or over (about 50 percent of the households).[4] Because information on state-provided home care is missing for Greece and Switzerland, we exclude these two countries from the analysis (about 15 percent of the total sample) leaving nine countries: Austria (AU), Germany (DE), Sweden (SE), the Netherlands (NL), Spain (ES), Italy (IT), France (FR), Denmark (DK), and Belgium (BE). Once observations with missing values on the variables of interest are removed, the final sample consists of 6,357 households, encompassing 3,204 married or cohabiting couples (hereafter, "couples") and 3,153 single, widowed, or divorced individuals ("singles"). Of these, 2,716 respondents are

4. The studies mentioned earlier use similar selection criteria.

male and 3,641 female. The last column of Table 1 reports the age composition of the sample.

A. *Informal and formal home care*

SHARE adopts a definition of home care that conforms to the OECD definition of long-term care (Fujisawa and Colombo, 2009). Informal care includes three tasks: (i) personal care, such as dressing, bathing or showering, eating, getting in or out of bed, using the toilet; (ii) help with practical household tasks, such as home repairs, gardening, transportation, shopping, household chores; and (iii) help with paperwork, such as filling out forms and settling financial or legal matters. Using the responses to a questionnaire item asking respondents how often and for how much time they or their partners have been receiving these types of help, we compute the total hours of informal care received per week. Total hours can be further disaggregated as the survey data not only contain detailed information on the identity of the first three informal care providers, each of whom could have any relationship to the elderly respondent (see Table B1, Appendix 2), they record, on a household level, the total time each caregiver devotes to home care[5] and the tasks they perform. Table 1 shows the informal home care received by for couples, single males and single females. "Weekly hours" in table 1 is the number of hours of informal care provided per week by children, relatives, and friends, respectively, and is conditional on the elderly respondent receiving informal care. N is the number of observations (households) in each age group.

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5. However, they report only the amount of home care for each provider on all tasks together, not on each task individually.

<Insert Table 1 about here>

The overall picture that emerges from Table 1 is that on average the elderly receive almost as much home care from friends and relatives as from children. Moreover, although total hours of care from children and friends increase with age among couples and among singles, total hours of care from relatives do not increase with age among couples but do increase with age among singles. Likewise, the incidence of personal care from each type of caregiver increases with age among both couples and singles; however, although the incidence of household care from each type increases with age among couples and single women, it decreases from age 80 onwards for single men. Most of the third type of informal care, the paperwork with which the elderly deal with legal or financial matters, is provided by children, especially when the individual is over 85. Singles, however, receive more frequent informal care than couples, which may suggest that if a respondent is married, the partner, rather than someone outside the household, provides care. A comparison of single men and women also reveals a noteworthy difference: single men receive relatively more help from relatives and friends, whereas single women receive relatively more help from children, particularly with household care.

State-provided (formal) home care includes three tasks: (i) professional or paid nursing or personal care, (ii) professional or paid home help, and (iii) meals-on-wheels. Table 2 reports for the first two tasks the incidence and number of hours per week and for meals-on-wheels the weeks per year in which the service was received. The overall

picture that emerges from Table 2 is that formal care increases with age and singles demand more formal care than couples.

A comparison of Table 1 and 2 indicates that the incidence and hours of informal and formal home care are, on average, similar; however, one important difference is that the demand for formal relative to informal care increases as people age. This observation may indicate that as the elderly age, they need higher level caring skills and thus more support provided by professional institutions. Alternatively, according to Lakdawalla and Philipson (2002), it may be that at relatively younger ages, friends and relatives are in better health and thus provide a larger pool of potential informal caregivers.

<Insert Table 2 about here>

There are significant differences across European countries both in formal and informal care provision, which, according to Reher (1998), could reflect a mix of cultural and institutional differences. Whereas examining these issues in detail is beyond the scope of this paper and the relatively few observations per country prevent a thorough analysis of home care provision at a country level, we do provide country-specific summary statistics on all variables addressed in the analysis (see Appendix 2, Tables B2–B4).

B. Characteristics of the elderly and their children

Table 3 reports the socioeconomic characteristics of the elderly by gender and age. Here, sociability refers to the number of social activities in which the elderly respondent had

been involved during the month prior to the interview.[6] Marital status is 1 if married or cohabiting, 0 otherwise (single); and education is measured in years of education completed.

<Insert Table 3 about here>

Table 4 presents the health characteristics of the elderly by gender and age. ADL refers to limitations in the activities of daily living, is equal to 1 when the elder suffers one or more limitations, 0 if none.[7] Likewise, GALI, the global activity limitation indicator, is equal to 1 if the respondent is limited, 0 if not.[8] IADL, the instrumental activities of daily living limitations,[9] is equal to 1 if the elder has one or more limitations, 0 if none. Chronic diseases are divided into severe conditions, such as cardiovascular diseases and cancers, and mild conditions like high blood pressure and stomach problems.

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6. Social activities include volunteer and charity work; active membership in a church, sports, or social club; or political involvement.

7. ADL includes 6 activities: (i) dressing, including putting on shoes and socks; (ii) walking across a room; (iii) bathing or showering; (iv) eating, such as cutting up one's food; (v) getting in and out of bed; and (vi) using the toilet, including getting up and down.

8. The question for this index is the following: "For the past 6 months at least, to what extent have you been limited because of a health problem in activities people usually do." The possible response range is "severely limited," "limited but not severely," and "not limited."

9. IADL includes seven activities: (i) using a map to determine how to get around in a strange place; (ii) preparing a hot meal; (iii) shopping or buying groceries; (iv) making telephone calls; (v) taking medicine; (vi) working around the house or garden; and (vii) managing money, such as paying bills and keeping track of expenses.

The dummy variable SEVERE is equal to 1 if a respondent has one or more severe conditions, 0 otherwise. MOBILITY is equal to 1 if the elderly individual has any mobility limitations, 0 if none.[10] The variable MENTAL proxies the elderly respondent's mental health and takes value 1 if one or more depression symptoms from the so-called EUROD scale are present, 0 if not. NUMERACY, assessed by questions on numerical literacy, is equal to 1 if the response score is poor, 0 otherwise.[11] READING takes value 1 if self-reported reading skills are fair or poor, 0 otherwise . The overall picture that emerges from Table 4 is that health limitations increase with age and, with the exception of severe health conditions, women have more health limitations than men.

<Insert Table 4 about here>

Table 5 reports characteristics related to the children of the elderly respondents. The distance variable is normalized (between 0 and 1) and takes a value of 1 if the child is living over 500 kilometres away (or abroad), but 0 if parents and children co-reside. Leisure is also normalized and is equal to 0 for the full-time employed, .5 for part-time workers, and 1 for children who are not employed. The characteristics of sons and

10. Assessment of these limitations is based on such classifications as "walking 100 meters," "sitting for about 2 hours," and "getting up from chairs after sitting for long periods."

11. The respondents are asked to perform four basic numerical operations in a specific economic or financial scenario. Based on these, Dewey and Prince (2005) built an index ranging from bad (1) to very good (5) numeracy skills. Here, NUMERACY is a dummy variable that takes value 1 if the index generated is 1 or 2, 0 otherwise.

daughters are, on average, about the same except that daughters have more leisure than sons.

<Table 5 about here>

III. Theoretical Framework and Empirical Model

This section first presents a theoretical framework for the supply and demand of informal and formal home care from outside the household. Insights into the trade-offs faced by home care providers are particularly helpful for the empirical specification of the model and the interpretation of the results.[12] Next we outline the empirical model for analyzing the effects of elder's health status and family structure on the composition of homecare to the elderly people.

A Theoretical framework

The point of departure for our home care demand analysis is a static framework that maximizes the utility of the home care receiver and providers they derive from consumption, leisure and health,. The individual demanding home care is the potential care receiver, while those who can supply informal home care (i.e., adult children, friends, and relatives) are the potential informal care providers. Lastly, professional institutions (the state) are the providers of formal home care. The total demand for home care depends on the health status of potential receivers (the elderly), while its allocation

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12. See Byrne, Goeree, Hiedemann, and Stern (2009) for a structural model of family decisions about the provision of informal versus formal care for the elderly.

among informal and formal suppliers depends on the preferences and characteristics of the potential informal home care providers; specifically, their degree of altruism toward the care recipient, the opportunity costs of providing informal care (i.e., their labor supply), and the distance they live from the elderly person.

In this model, the consumption by individual i is denoted by C^i, health by H^i, and leisure by L^i. For each care receiver e, the potential informal care providers are indexed by $j=1,...,J$, are denoted by j and the care receiver by e. Individual j could be a child, a friend, or a relative who provides unpaid home care IC^j to the elderly e. In contrast, formal care FC is bought on the market. The health problems of the elderly recipient are denoted by δ and, in combination with home care HC, produce the actual health status H^e. The (unknown) transformation function is denoted by $G(.)$.

We assume that the care providers are in perfect health,[13] $H^j = 1, \forall j$, and that the elderly recipient does not work, $L^e=1$. The total available time is normalized to 1. A^j denotes the labor supply of care provider j and w the provider's wage rate. θ^j is a distance measure equal to 1 if informal care provider j is living near the elderly person but may exceed1 if the provider is living far away. B is a bequest from the elderly recipient to the informal care provider(s); however, we assume that the bequest is not strategic in the sense of Bernheim et al. (1985); that is, it bears no relationship to the care provided. This assumption does not seem restrictive: Byrne, Goeree, Hiedemann, and Stern (2009) and Callegaro and Pasini (2008) both allow for a strategic bequest in their model, although they find no empirical evidence to support it.

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13. Alternatively, the health status of the informal care provider, albeit not perfect for some, is fixed.

In our model, an informal care provider faces a trade-off between care provision and leisure or labor supply. That is, the care provider's utility depends on consumption and leisure, and is assumed to behave altruistically. When the elderly demand home care (dependent on health status), the benefits of an increase in informal care provision comes from the altruistic preferences of the care providers. Hence, the costs of an increase in hours spent providing informal care equal a reduction in leisure and/or labor supply. This latter reduction in turn decreases consumption. We formulate the decision of the potential care provider as follows:

$$(1) \quad \max_{L^j, IC^j} \quad U^j\left(C^j, H^j, L^j\right) + \pi^j U^e\left(C^e, H^e, L^e\right).$$

In a similar vein, the benefits from home care for the elderly e come from the implied increase in H^e, which in turn increases U^e. The costs come from the altruistic preferences: a reduction in care providers leisure or consumption lead to a utility reduction. We formalize the trade-off of the informal care receivers as a utility maximization:

$$(2) \quad \max_{IC^{j=1,\dots,J}, FC, B} \quad U^e\left(C^e, H^e, L^e\right) + \pi^e \sum_j U^j\left(C^j, H^j, L^j\right).$$

Both these optimization problems are subject to the following constraints:

$$(3) \quad H^e = G\left(\delta; HC\right),$$

$$(4) \quad HC = FC + \eta \sum_j IC^j,$$

$$(5) \quad H^j = 1,$$

$$(6) \quad C^e = Y^e - pFC - B,$$

$$(7) \quad C^j = w^j A^j + \frac{1}{J}B,$$

(8) $A^j = 1 - \theta^j IC^j - L^j$

(9) $L^e = 1$,

(10) $C^e \geq 0$,

(11) $C^j \geq 0$.

Here, the utility function $U(.)$ is an additive separable version of a standard altruistic utility function (Becker, 1976). The parameter η in Equation (4) allows for imperfect substitution between hours of informal and formal home care. According to Byrne Goeree, Hiedemann, and Stern (2009), one hour of informal care from an adult child corresponds to more than one hour of formal care i.e. $\eta>0$. On the other hand, Bonsang (2008) argues that some elders' disability requires skills that only professionals have, meaning that in this case, one hour provided by family would be less effective than one hour provided by the state ($\eta<0$). Equation (4) allows for both $\eta<0$ and $\eta>0$. The weight π^j, which accounts for the degree of altruism of each individual involved, can be used to distinguish between friends, children, and relatives. Specifically, π^e is the weight that the care receiver assigns the care provider's utility. Solving the problem outlined by Equations (2)–(11) yields the following price-equilibrium condition:[14]

(12) $\dfrac{1}{p} = \dfrac{1}{J} \sum_j \left(\dfrac{\eta}{\theta^j w^j} \right).$

Solving the utility optimization problem of the potential care provider, outlined by Equations (1), (3)–(11), yields an expression for the trade-off for care provider j:between providing informal care and leisure:

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14. The full derivation of Equations (12) and (13) is given in Appendix A.

$$(13) \quad \frac{\partial U^e}{\partial H^e} \frac{\partial H^e}{\partial IC^j} = \frac{\theta^j}{\pi^j} \frac{\partial U^j}{\partial L^j}.$$

For more insight into the implications of Equations (13), we specify the following

logarithmic utility function, $U^i\left(C^i, H^i, L^i\right) = \ln(C^i H^i L^i)$, which yields a relationship

between the share of informal home care provided by j and the various parameters and

variables of the model:

$$(14) \quad \frac{IC^j}{HC} = \frac{\left(1-A^j\right)}{\theta^j} \frac{1}{HC} - \left(\varepsilon \eta \pi^j\right)^{-1},$$

where ε is the home care elasticity of health and $\varepsilon = \dfrac{\partial H^e}{\partial HC} \dfrac{HC}{H^e}$. In the model outlined

above, HC is given by Equation (3) and depends on the elderly recipients's health status;

that is, $HC = G^{-1}\left(\delta; H^e\right)$. As Equation (14) shows, conditional on total home care HC, a

decrease in the labor supply of care provider j (i.e., an increase in (1-A^j)) increases the

relative share of informal home care provided by j. The further away a care provider lives

(i.e., an increase in θ^j) or the less effective the informal care (i.e., a smaller η), the less

informal home care j provides (relatively). Conversely, the higher the degree of altruism

(π^j), the higher the relative informal home care provision by j. Furthermore, an increase in

total home care (HC) decreases the relative share of informal home care provided by j.

B. Empirical model

The empirical model consists of two jointly estimated parts. Equations (15) and (16)

formalize the relationship between home care demand—that is, the total hours of

informal and formal home care—and the health conditions of the female and male elderly

in the household (or the one individual in the case of a single person household).
Equations (17)–(20) represent the shares of home care and formalize how family characteristics affect the relative provision of formal and informal home care.

It should first be noted that whereas the economic framework of the previous section does not rule out coresiding partners as potential care providers, because of data limitations, the empirical counterpart is restricted to care given to the elderly household as a whole by non-coresident informal caregivers. That is, SHARE reports only those who provide care to the respondents' household, not to each family member. Hence the elderly household is treated as a single recipient with, in case of a couple, the characteristics of both partners. HC^* is the total home care demanded by the elderly household and is assumedly determined by the elderly recipients' health status, $HC^* = G^{-1}\left(\delta; H^e\right)$, as given in Equation (3). By a linear approximation of the (unknown) inverse function G^{-1}, we formalize this relationship as follows:

(15) $HC^* = \gamma_0 + \gamma_1'H^w + \gamma_2'H^m + \gamma_3'W + \upsilon$,

where H^w and H^m are sets of variables on the health limitations for each elderly person in the household and W is a set of socioeconomic control variables such as age, household income, gender, marital status, and children's characteristics. The model also controls for country specific effects. The theoretical model described above in section A may yield a corner solution when, for instance, elderly are in good health and receive no home care and tables 1 and 2 also show that many households receive no home care. The empirical model takes this explicitly into account by treating the observed total home care (*HC*) as a censored variable (at 0) which relates to the (unobserved) latent home care variable (HC^*) as follows:

$$(16) \quad HC = \begin{cases} 0 & if \quad HC^* \le 0 \\ HC^* & if \quad HC^* > 0 \end{cases}.$$

Equations (17)–(20) represent the share of home care and formalize how family characteristics affect the *relative* provision of informal home care by children (SIC^c), relatives (SIC^r), and friends (SIC^n), as well as the formal home care provided by the state (SFC):

$$(17) \quad SIC^c = \beta_{10}{}' + \beta_{11}{}'X + \beta_{12}{}'HC + \varepsilon_1,$$

$$(18) \quad SIC^r = \beta_{20}{}' + \beta_{21}{}'X + \beta_{22}{}'HC + \varepsilon_2,$$

$$(19) \quad SIC^n = \beta_{30}{}' + \beta_{31}{}'X + \beta_{32}{}'HC + \varepsilon_3,$$

$$(20) \quad SFC = \beta_{40}{}' + \beta_{41}{}'X + \beta_{42}{}'HC + \varepsilon_4.$$

By construction, all shares, defined as the home care provided by a particular type of provider (children, relatives, friends, or the state) over the total hours of home care provided (x100), add up to 100%. The explanatory variables (X) include household income, sociability, marital status, gender, education, age, country-specific dummy variables, and children's characteristics. As pointed out in the theoretical model, children's leisure and distance from the elderly parents' house may influence the relative amount of informal care provided by children and thus that given by other care providers. The theoretical model also motivates the inclusion of total home care (HC) as a determinant of relative home care for each type of care provided. HC, being an endogenous variable, is instrumented by health characteristics. All exogenous variables included in X are also included in W in Equation (15). The error terms υ, ε_1, ε_2, ε_3, and ε_4 are assumed to be normally distributed with a (conditional) mean of 0 and constant variances, and are allowed to be correlated.

The share equations, (17)–(20), are conditional on the reception of positive home care. We use the estimation procedure proposed by Vella (1993), which explicitly takes into account the sample selection induced by the endogenous and censored regressor HC and also the fact that sons and daughters' leisure time (or labor supply) are endogenous explanatory variables that must also be instrumented. As already mentioned, the model assumes that the elderly recipient's health variables, age and education, marital status, income, and sociability, and the adult children's characteristics like age, distance from the parents' house, and education are exogenous variables. Essentially, we assume that the observed health limitations do not affect who provides the home care. However, because this assumption would be violated if some health limitations require more skilled care than others, it may influence the allocation of informal versus state-provided home care. Therefore, in Section IV, we test this assumption by exploiting the fact that we have more instruments than endogenous explanatory variables (an overidentification test).

IV. Estimation Results

The empirical results are reported in Tables 6 and 7. Section A discusses the determinants of total homecare for the elderly (Table 6) and Section B discusses the determinants of the relative demand for informal homecare provided by children, relatives and friends, and formal homecare provided by the State (Table 7).

A. *The demand for home care*

Table 6 reports the results for the total demand for home care, regressed on all the exogenous variables included in the model. As the table shows, marital status has a very

strong negative effect on the demand for home care: a married couple demands less home care than singles. This finding is in line with Lakdawalla and Philipson's (2002) proposition, based on observed life spans for both sexes, that relative increases in the share of healthy elderly males could drive down the demand for state-provided (or informal) care because husbands and wives could take care of each other in their final years if they are living together. Likewise, because women live on average longer than men, improving men's health conditions could reduce the years of widowhood. Among singles, women demand somewhat more home care than men, and the demand for home care increases with age. This latter result may be due to unobserved health characteristics that probably have a similar age pattern to those reported in Table 4. Likewise, an increase in home care as income rises may result from wealthier households' ability to buy formal home care on the market. The number of grandchildren, years of education, and sociability, however, do not significantly affect the demand for home care.

Health status variables have a strong impact on the demand for health care. In particular, the health care variables for limitations on daily living (ADL and IADL), general activity (GALI), and mobility are all significant and have the expected sign. They also affect the demand for home care by both men and women, although for women especially, severe conditions result in a significant increase in the demand for home care. Finally, the children's characteristics are mostly insignificant except for the son's years of education and the daughter's age. If the sons have a higher level of education, they are more inclined to concentrate on their own careers, which the elderly may take into account when demanding home care. An increase in home care as the daughter's age rises may reflect more leisure time after her children have left the home.

In sum, the results outlined in Table 6 are in line with the findings of previous studies: the major determinants of the demand for home care are age, marital status, and health condition, particularly, ADL, IADL, GALI, mobility, and mental health.

<Insert Table 6 about here>

B. Determinants of home care composition

Table 7 reports the regression results for home care composition, which take into account four types of home care provision: (i) informal home care provided by children, (ii) informal home care provided by relatives (other than children), (iii) informal home care provided by friends (including neighbors), and (iv) state-provided (or formal) home care. Again, the shares add up to 100 percent, and the parameter estimates are interpreted as percentage point changes. At the bottom of Table 7, we report test statistics for the exogeneity of the children's leisure,[15] total home care, and the overidentification test for instrument exogeneity. These test statistics provide little empirical evidence that sons and daughters' leisure is an endogenous variable in the model. They do suggest, however, that in two out of four share equations, total home care is an endogenous explanatory variable, thereby underscoring the importance of instrumenting this variable. The conditional moment test statistic also shows that for three out of four equations, we cannot reject instrument exogeneity,[16] which supports the assumption (see Section III) that observed

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15. The estimation results for the reduced form equations for sons and daughters' leisure are available from the authors.

16. Using a more flexible age function yields p-values for all equations that are above 5 percent without affecting our main conclusions. We also tested whether or not the instruments have sufficient explanatory

health limitations do not affect who provides the home care. This result also echoes Lakdawalla and Philipson's (1999) finding that the elderly are willing and able to take care of all but the most severely disabled others (who demand care that cannot be provided at home).

<Insert Table 7 about here>

Relative home care provided by children increases with the number of children, their age, and the proximity of the children's residences to that of their parents. These results can be interpreted in a time allocation framework as measures of the opportunity cost for children of providing home care rather than pursuing other activities. If the children's provision of home care becomes more costly, they provide less home care, which, the results show, significantly increases the relative amount of home care provided by friends but does not affect the relative provision of state-provided care (most effects are insignificant). In other words, the home care provision of friends acts as a substitute for that of children. In addition, the relative amount of home care provided by children declines as respondents' household income declines, which may be explained by the strong correlation between parental and children's income. A higher income level is also associated with higher opportunity costs of children's home care provision. In line with the predictions of a time allocation model, we also find positive effects for sons and

power (see Bound, Jaeger, and Baker, 1995): in the first stage regressions, the partial F-test statistics are all above 9 with p-values that are virtually zero.

daughters' leisure on relative home care provision, but, as reported by Stern (1995), these effects are mostly insignificant.

Although the age of the elderly does not affect the relative amount of home care provided by children, it reduces the relative amount of home care provided by friends and increases the relative amount provided by the state. This finding may be explained in two ways. First, in line with Bonsang (2008), older parents may need more skilled care. Second, as claimed by Lakdawalla and Philipson (2002), as the elderly age, so do their friends, which reduces the number of potential informal care providers other than children. This reduction may be due to disabilities among friends who, at first, could provide home care but then become informal home care receivers because of their worsening health. Related to this latter explanation is the fact that more social activity (and therefore more friends) is associated with more informal care from friends and less from the state. Lastly, when the elderly are married, they are also more likely to receive care from friends, although this effect is insignificant.

The last row of Table 7 shows the effect on home care composition of an exogenous increase in total hours of home care (e.g., because of worsening health). Specifically, a one hour increase in total home care decreases the shares of informal care provided, particularly from relatives, and increases the relative amount of care provided by the state by 0.58 percentage points. Whereas these effects are relatively small, they do imply that any exogenous change in the demand for home care causes a substitution of informal home care with state-provided care.

V. Summary and Conclusions

This analysis examines the determinants and composition of home care received by the elderly in Western Europe using data from the Survey of Health, Ageing and Retirement in Europe (SHARE). In line with previous studies, we show that (instrumental) limitations on tasks of daily living, mobility, and general activity, as well as mental health, age, and marital status, are significant and important determinants of home care.

New empirical findings emerge from a detailed analysis of the home care received from the different potential homecare providers, i.e. from children, other relatives, friends and neighbors, and the state. Descriptive statistics show that relatives and friends provide as much home care as adult children. The empirical analysis of the relative demand from different potential home care providers shows that, conditional on total demand for home care, a reduction in its provision by children results in an increase in provision by friends and, to a much lesser extent, by the state. In other words, home care provision by friends substitutes for informal care provided by adult children. With increased age, however, although the relative importance of home care by friends decreases and the relative amount of home care provision by children and relatives remains unaffected, the relative demand for state-provided home care increases. This shift may result from friends' (including neighbors) becoming care receivers and no longer being able to provide care to others. Likewise, an increase in the total hours of home care—for instance, because of worsening health—results in a higher relative increase in state-provided care but reduces the relative provision by informal caregivers. These latter effects are, however, relatively small.

These new empirical findings strongly support Lakdawalla and Philipson's (2002) claim that friends and neighbors are important potential care providers. Hence, neglecting their role would lead to an underestimation of the role of informal care and would bias results on the interaction between informal and state-provide home care. Such neglect might, therefore, lead to misguided policy recommendations for informal home care provision and state-provided home care. Indeed, the empirical evidence reported here suggests that when people continue to live longer in better health—i.e. a compression of morbidity—this could alleviate increased home care costs for the state by increasing the number of potential informal care providers.

Acknowledgments

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Appendix 1

Lagrangian Functions and First Order Conditions

The Lagrange function corresponding to the constraint maximization problem of the elderly (i.e., Equations 2)–(11)), is given by

(A1) $\quad L\left(IC^j, FC, B, \lambda_1, \lambda_j; j = 1,..,J\right) =$

$$U^e\left(C^e, H^e, L^e\right) + \pi^e \sum_j U^j\left(C^j, H^j, L^j\right)$$

$$+ \lambda_1\left(Y^e - pFC - B\right)$$

$$+ \sum_j \lambda_j\left(w^j\left(1 - \theta^j IC^j - L^j\right) + \frac{1}{J}B\right).$$

The Lagrange multipliers corresponding to the budget constraints of the elderly and care providers are denoted by λ_1 and λ_j, respectively. The first order conditions are as follows:

(A2) $\quad$ w.r.t.: IC^j: $\dfrac{\partial U^e}{\partial H^e}\dfrac{\partial H^e}{\partial HC}\dfrac{\partial HC}{\partial IC^j} + \pi^e \dfrac{\partial U^j}{\partial C^j}(-\theta^j w^j) + \lambda_j(-\theta^j w^j) = 0$,

$\quad$ j=1,..,J .

(A3) $\quad$ w.r.t.: FC: $\dfrac{\partial U^e}{\partial C^e}(-p) + \dfrac{\partial U^e}{\partial H^e}\dfrac{\partial H^e}{\partial HC}\dfrac{\partial HC}{\partial FC} + \lambda_1(-p) = 0$,

(A4) $\quad$ w.r.t. B: $\dfrac{\partial U^e}{\partial C^e}(-1) + \pi^e \sum_j\left(\dfrac{\partial U^j}{\partial C^j}(\dfrac{1}{J})\right) + \lambda_1(-1) + \sum_j \lambda_j(\dfrac{1}{J}) = 0$.

Substituting Equations (A2) and (A3) in (A4) and using $\dfrac{\partial HC}{\partial IC^j} = \dfrac{\partial HC}{\partial IC}$ yields

(A5) $\quad \dfrac{\partial HC / \partial FC}{\partial HC / \partial IC} = \dfrac{1}{J} \sum_{j} \left(\dfrac{p}{\theta^j w^j} \right).$

Equation (4) yields Equation (12) in Section III, $\dfrac{1}{p} = \dfrac{1}{J} \sum_{j} \left(\dfrac{\eta}{\theta^j w^j} \right)$. The Lagrange

function corresponding to the constraint maximization problem of care provider j, (i.e.,

Equations (1), (3)–(11)) is given by

(A6) $\quad L\left(X_{ic}^j, L^j, \lambda_j^* \right) = U^j \left(C^j, H^j, L^j \right) + \pi^j U^e \left(C^e, H^e, L^e \right)$

$$+ \lambda_1 \left(Y^e - pFC - B \right)$$

$$+ \lambda_j^* \left(w^j \left(1 - \theta^j IC^j - L^j \right) + \dfrac{1}{J} B \right).$$

The first order conditions are as follows:

(A7) $\quad$ wrt IC^j $\quad \dfrac{\partial U^j}{\partial C^j}(-\theta^j w^j) + \pi^j \dfrac{\partial U^e}{\partial H^e} \dfrac{\partial H^e}{\partial IC^j} + \lambda_j^*(-\theta^j w^j) = 0,$

(A8) $\quad$ wrt L^j $\quad \dfrac{\partial U^j}{\partial L^j} + \dfrac{\partial U^j}{\partial C^j}(-w^j) + \lambda_j^*(-w^j) = 0.$

Substituting Equation (A8) in Equation (A7) yields Equation (13) of Section III.

Appendix 2

Table B1

Within-group Percentages of Children and Nonchildren Care Providers

Informal care resources	Percentages (%)
Sons only	39.4
Daughters only	49.2
Sons and daughters	11.4
All children	100.0
(Ex-)Spouse	2.0
Parents (-in-law)	0.8
Siblings	8.8
Son-in-law	8.6
Daughter-in-law	7.7
Grandchild	8.2
Other relatives	12.2
Friends and neighbors	51.6
All nonchildren	100.0

Table B2

Informal Home Care Provisions by Country

Country	Weekly hours (average)			Personal care (%)			Household care (%)			Paper work (%)			Number of
	children	relatives	friends	children	relatives	friends	children	relatives	friends	children	relatives	friends	Households
Couples													
Austria	3.13	5.20	2.42	0.49	0.99	0.99	10.84	4.93	4.93	4.93	0.49	0.00	203
Germany	7.38	7.88	1.93	1.54	0.88	0.66	17.32	7.24	8.55	5.26	1.97	1.54	456
Sweden	1.64	1.51	1.90	0.46	0.00	0.23	8.76	3.92	4.61	1.84	0.46	0.46	434
Netherlands	1.74	5.05	1.10	0.76	0.51	0.00	5.33	3.30	3.55	2.79	2.03	3.55	394
Spain	18.51	36.10	6.62	3.24	1.44	0.00	4.68	1.80	1.80	3.24	1.80	0.36	278
Italy	8.16	20.05	8.30	1.45	0.29	0.87	5.51	2.03	0.87	4.64	0.87	1.16	345
France	9.17	7.22	0.77	0.28	0.85	0.00	3.66	1.13	2.82	3.10	1.41	0.56	355
Denmark	6.89	2.37	0.84	0.52	1.03	0.52	10.31	3.09	9.28	2.06	1.03	1.03	194
Belgium	3.97	3.22	2.36	0.55	0.55	0.37	5.50	4.59	4.95	1.65	1.83	0.55	545
Single men													
Austria	6.01	8.23	2.46	4.82	1.20	0.00	14.46	6.02	9.64	8.43	1.20	0.00	83
Germany	6.63	4.94	1.46	4.05	1.35	1.35	14.86	14.86	9.46	17.57	4.05	1.35	74
Sweden	5.76	1.25	2.03	0.94	0.00	0.94	9.43	10.38	9.43	1.89	2.83	3.77	106
Netherlands	7.13	1.16	14.17	2.53	0.00	1.27	10.13	8.86	10.13	5.06	6.33	6.33	79
Spain	17.04	24.96	0.00	3.13	1.56	0.00	6.25	9.38	0.00	6.25	1.56	0.00	64
Italy	36.77	4.49	9.01	1.52	3.03	1.52	6.06	6.06	3.03	6.06	7.58	1.52	66
France	9.73	5.19	1.98	0.99	0.00	0.00	9.90	9.90	11.88	8.91	4.95	0.99	101
Denmark	1.85	0.67	2.17	1.37	1.37	0.00	6.85	5.48	12.33	5.48	1.37	1.37	73
Belgium	8.95	6.65	2.68	2.92	1.46	0.00	15.33	10.22	11.68	5.11	1.46	1.46	137
Single women													
Austria	8.98	7.14	4.56	4.80	2.70	1.50	20.12	12.61	8.71	10.51	4.50	1.50	333
Germany	8.53	3.20	2.23	3.28	2.46	2.05	27.05	15.57	17.21	15.98	4.10	3.28	244
Sweden	3.54	2.20	2.12	2.73	0.39	1.56	25.00	9.38	15.23	14.84	2.73	0.78	256
Netherlands	3.84	0.60	1.84	1.49	0.50	1.49	13.93	7.96	15.42	15.92	7.46	2.49	201
Spain	18.25	8.46	6.23	5.78	5.78	0.89	13.78	6.67	4.00	10.22	3.56	0.44	225
Italy	19.42	6.50	5.49	4.21	3.27	1.87	9.35	7.48	4.67	9.81	5.61	2.34	214
France	1.03	6.95	6.78	2.34	0.58	0.29	19.30	7.89	10.53	14.04	3.22	2.05	342
Denmark	2.57	1.20	2.99	1.02	0.00	0.51	22.45	12.76	20.92	11.22	0.51	2.55	196
Belgium	7.73	2.44	2.49	3.06	0.28	0.56	25.91	17.27	16.43	15.60	3.34	1.67	359

Table B3

State-Provided (Formal) Care by Country

State provided	Personal care		Household care		Meals-on-wheels		Number of Households
Country	Incidence %	Weekly hours average	Incidence %	Weekly hours average	Incidence %	Weeks per year average	
Couples							
Austria	5.42	11.87	3.45	0.89	1.97	4.67	203
Germany	1.97	1.85	1.10	1.07	0.88	3.00	456
Sweden	1.61	0.61	3.00	4.97	1.38	11.37	434
Netherlands	3.30	0.55	10.41	2.37	0.51	2.22	394
Spain	6.47	0.29	4.32	1.22	0.36	0.03	278
Italy	2.03	0.38	2.61	5.53	0.00	0.00	345
France	21.97	0.41	5.63	1.44	0.28	0.61	355
Denmark	4.12	0.46	9.79	1.74	1.55	5.64	194
Belgium	14.13	0.95	9.91	1.82	0.92	1.20	545
Single men							
Austria	3.61	1.95	6.02	3.09	6.02	21.09	83
Germany	5.41	1.80	2.70	0.43	5.41	19.00	74
Sweden	0.94	0.41	13.21	3.02	2.83	6.47	106
Netherlands	6.33	0.71	21.52	2.34	10.13	13.00	79
Spain	1.56	0.08	6.25	5.69	0.00	0.00	64
Italy	0.00	0.00	12.12	9.17	0.00	0.00	66
France	16.83	1.75	16.83	2.64	6.93	9.59	101
Denmark	4.11	0.05	26.03	0.99	15.07	22.30	73
Belgium	10.22	1.05	18.98	3.56	8.03	12.78	137
Single women							
Austria	5.71	3.65	7.81	2.54	4.80	12.65	333
Germany	4.92	2.80	7.79	4.70	6.97	16.00	244
Sweden	3.13	0.12	18.75	3.79	5.08	11.91	256
Netherlands	8.96	0.91	34.33	2.42	6.97	5.67	201
Spain	4.00	0.16	11.11	6.03	0.00	0.00	225
Italy	1.87	0.24	3.74	15.71	0.00	0.00	214
France	19.01	0.76	17.84	2.94	4.68	4.89	342
Denmark	10.71	0.69	31.12	0.90	8.67	11.54	196
Belgium	19.22	1.63	29.25	3.68	6.13	5.36	359

Table B4

Socioeconomic Characteristics of the Elderly by Country

Country	Income (in euros)	Sociability (index)	Married (proportion)	Education (years)	Age (years)	Sons (number)	Daughters (number)	Grand-children (number)
Men								
Austria	30,333	0.62	0.71	11.71	72.13	0.89	1.02	2.78
Germany	28,001	0.79	0.86	13.90	71.31	0.91	1.01	2.81
Sweden	33,860	0.87	0.80	9.58	73.15	1.16	1.20	4.29
Netherlands	35,242	0.86	0.83	11.10	72.87	1.33	1.24	4.14
Spain	14,618	0.27	0.81	4.72	73.61	1.29	1.25	4.11
Italy	15,835	0.25	0.84	6.42	71.97	1.13	1.03	2.89
France	29,437	0.62	0.78	8.00	73.38	1.14	1.09	4.31
Denmark	25,084	0.90	0.73	13.05	73.21	1.19	1.17	4.33
Belgium	25,591	0.77	0.80	9.88	73.52	1.16	1.08	4.00
Total	26,108	0.68	0.80	9.85	72.81	1.14	1.12	3.76
Women								
Austria	21,590	0.53	0.38	10.45	72.20	0.88	0.98	3.15
Germany	23,389	0.69	0.65	12.36	70.94	0.95	1.03	2.96
Sweden	27,174	0.83	0.63	9.58	71.62	1.12	1.14	4.14
Netherlands	29,733	0.85	0.66	9.93	71.10	1.29	1.27	4.55
Spain	11,271	0.27	0.55	4.09	73.24	1.23	1.19	4.50
Italy	13,905	0.22	0.62	5.36	70.10	1.13	1.11	3.41
France	23,156	0.54	0.51	6.90	72.81	1.12	1.14	4.55
Denmark	21,163	0.81	0.50	11.10	72.79	1.17	1.13	4.64
Belgium	22,026	0.70	0.60	9.30	72.33	1.18	1.12	4.33
Total	21,163	0.62	0.57	8.86	71.87	1.12	1.12	4.02

Table B5

Health Characteristics of the Elderly by Country

Country	ADL %	GALI %	IADL %	SEVERE %	MOBILITY %	MENTAL %	NUMERACY %	READING %
Men								
Austria	9.09	48.95	17.13	27.62	50.00	12.24	10.84	8.04
Germany	9.81	57.92	14.15	34.15	57.55	14.34	14.91	13.02
Sweden	9.63	46.85	12.96	44.26	45.74	13.33	7.41	4.63
Netherlands	8.88	39.96	16.49	39.75	42.92	16.28	9.51	15.01
Spain	11.70	47.95	22.81	30.41	57.60	26.90	50.58	46.49
Italy	13.14	44.53	14.11	33.09	52.55	26.52	33.09	35.52
France	16.01	45.83	16.67	39.47	50.00	26.32	28.29	19.74
Denmark	10.11	51.69	18.35	35.96	45.32	13.11	15.73	11.99
Belgium	11.88	40.18	17.89	41.79	46.19	15.98	15.84	10.41
Women								
Austria	12.31	57.09	27.24	21.46	67.16	26.68	19.03	12.13
Germany	11.86	63.57	19.86	25.00	68.71	27.57	26.86	12.86
Sweden	11.59	52.75	23.04	32.75	63.19	24.93	20.14	3.91
Netherlands	8.24	49.24	20.67	26.55	54.62	22.18	22.02	9.75
Spain	16.90	57.46	37.97	25.25	73.96	54.08	72.76	53.88
Italy	16.82	53.13	25.22	27.19	69.59	45.08	54.03	39.18
France	14.06	46.05	23.96	28.69	67.14	40.03	41.46	15.06
Denmark	9.74	53.59	24.87	34.10	56.67	19.49	28.72	10.00
Belgium	17.81	48.01	26.22	32.08	64.38	32.74	31.64	11.84

Table 1

Informal Home Care Provision by Age [a)]

Age [b)]	Weekly hours*			Personal care [c)]			Household care [c)]			Paper work [c)]			Number of Households
	children	friends	relatives	children	friends	relatives	children	friends	relatives	children	friends	relatives	
	average	average	average	%	%	%	%	%	%	%	%	%	#
Couples													
65-69	3.97	6.94	1.33	0.25	0.08	0.42	5.33	2.62	4.74	1.86	0.76	1.27	1182
70-74	5.47	4.52	3.27	0.55	0.55	0.22	7.24	2.63	2.63	2.20	1.32	0.88	911
75-79	7.39	9.78	1.96	1.40	0.93	0.31	9.77	4.03	5.58	4.03	0.62	1.09	645
80-84	5.77	6.98	2.15	3.31	1.93	0.55	12.95	7.44	5.23	5.79	3.31	1.38	363
85+	11.30	6.36	5.76	2.91	1.94	0.97	15.53	11.65	10.68	12.62	7.77	0.00	103
All	6.07	6.95	2.20	1.00	0.66	0.37	7.96	3.75	4.56	3.18	1.40	1.09	3204
Single men													
65-69	4.05	8.56	3.25	0.00	0.48	0.48	4.35	9.18	6.28	2.90	2.90	0.48	207
70-74	6.47	3.49	2.70	0.55	0.55	0.00	9.34	8.79	8.24	5.49	2.20	1.65	182
75-79	5.21	2.99	5.42	2.25	1.12	0.56	6.18	10.67	14.61	3.93	3.37	1.69	178
80-84	11.13	7.84	1.91	7.76	1.72	0.86	19.83	10.34	12.07	12.93	5.17	2.59	116
85+	14.31	6.81	10.79	5.00	2.00	1.00	25.00	6.00	4.00	16.00	4.00	5.00	100
All	9.34	5.71	4.20	2.43	1.02	0.51	10.86	9.20	9.20	6.90	3.32	1.92	783
Single women													
65-69	7.17	2.81	2.09	0.95	1.14	0.38	13.12	8.94	13.12	5.32	2.09	0.76	526
70-74	8.02	4.99	3.73	2.55	0.73	0.73	16.79	8.76	10.22	8.21	2.74	1.82	548
75-79	6.18	2.87	2.18	3.43	1.81	1.08	21.48	13.18	12.09	13.90	3.61	1.81	554
80-84	10.28	4.15	4.51	4.04	2.24	1.79	27.13	12.11	14.57	20.18	4.71	2.47	446
85+	9.36	6.73	5.11	7.09	3.38	2.36	26.35	14.53	13.18	25.00	8.11	3.04	296
All	8.24	4.18	3.39	3.25	1.69	1.14	20.21	11.18	12.49	13.25	3.84	1.86	2370

*Conditional on receiving home care from any provider.

a. "Relatives" are all relatives other than children; "friends" combines friends and neighbors.

b. For couples, age is based on the oldest person in the household.

c. Percentages refer to reception of a particular type of care from a certain type of care provider.

Table 2

State-Provided (Formal) Care by Age

Age[a]	Personal care		Household care		Meals-on-wheels		Number of households
	Incidence[b] %	Weekly hours[c] average	Incidence[b] %	Weekly hours[c] average	Incidence[b] %	Weeks per year average	
Couples							
65-69	4.15	0.53	1.52	0.79	0.08	0.02	1182
70-74	7.03	0.67	3.51	1.64	0.44	0.78	911
75-79	7.75	2.06	6.98	1.91	0.47	0.45	645
80-84	13.22	1.77	13.77	1.80	2.48	3.09	363
85+	16.50	0.65	33.98	4.90	8.74	9.37	103
All	7.12	1.24	5.62	1.96	0.81	2.11	3204
Single men							
65-69	1.45	0.08	4.83	4.59	1.45	12.00	207
70-74	2.75	0.06	8.79	2.16	7.69	19.10	182
75-79	6.74	0.41	14.04	3.82	4.49	8.09	178
80-84	8.62	1.10	22.41	2.86	7.76	12.18	116
85+	18.00	1.97	35.00	2.45	15.00	12.88	100
All	6.13	0.93	14.30	2.95	6.26	12.78	783
Single women							
65-69	3.80	1.88	5.70	3.26	0.57	1.21	526
70-74	7.85	3.59	8.58	4.81	1.28	1.91	548
75-79	8.12	0.69	17.33	2.54	4.15	5.47	554
80-84	14.13	0.78	26.46	3.27	8.30	9.18	446
85+	18.24	0.88	44.26	3.54	15.20	1.21	296
All	9.49	1.25	17.81	3.39	4.85	7.56	2370

a. For couples, age is based on oldest person in the household.
b. The percentages refer to the reception of a particular type of care.
c. Hours are conditional on receiving formal care.

Table 3

Socioeconomic Characteristics of the Elderly by Gender and Age (Sample Averages)

Age group	Household income	Sociability	Marital status	Years of education	Age	Number of sons	Number of daughters	Number of grandchildren
Men								
65-69	28,283	0.82	0.85	10.52	66.58	1.10	1.12	3.08
70-74	25,336	0.72	0.83	9.54	71.50	1.18	1.11	3.74
75-79	24,588	0.61	0.78	9.59	76.39	1.15	1.16	4.34
80-84	25,084	0.46	0.76	9.43	81.31	1.16	1.06	4.30
85+	23,156	0.38	0.51	8.97	88.00	1.06	1.17	5.00
All	26,108	0.68	0.80	9.85	72.81	1.14	1.12	3.76
Women								
65-69	24,343	0.79	0.69	9.81	64.47	1.13	1.13	3.24
70-74	21,590	0.66	0.62	8.75	69.64	1.17	1.15	4.00
75-79	19,930	0.57	0.54	8.39	74.82	1.12	1.14	4.48
80-84	18,583	0.40	0.45	8.12	79.93	1.08	1.09	4.64
85+	16,647	0.31	0.26	8.07	86.57	0.94	0.97	4.74
All	21,163	0.62	0.57	8.86	71.87	1.12	1.12	4.02

Table 4

Health Characteristics of the Elderly by Gender and Age

Age	ADL %	GALI %	IADL %	SEVERE %	MOBILITY %	MENTAL %	NUMERACY %	READING %
Men								
65-69	6.77	37.51	7.63	28.73	38.95	14.47	14.11	14.54
70-74	8.97	44.92	13.17	35.86	47.12	18.12	18.94	17.47
75-79	13.00	52.25	21.14	44.23	57.47	19.08	21.02	17.50
80-84	19.83	61.17	29.02	49.48	64.72	24.01	27.56	22.76
85+	26.11	60.10	45.32	47.29	67.00	26.60	36.95	19.70
Total	11.21	46.58	16.43	37.32	49.54	18.18	19.64	17.21
Women								
65-69	6.79	44.73	15.93	21.55	54.92	28.45	25.00	11.07
70-74	10.56	49.35	19.81	24.19	60.45	30.43	34.48	16.86
75-79	12.76	54.80	26.77	31.36	71.14	33.36	37.20	19.85
80-84	22.25	67.00	37.33	38.57	77.63	38.94	41.78	22.74
85+	37.84	68.92	54.14	41.85	83.46	42.61	50.38	31.08
Total	13.53	53.07	25.12	28.27	65.20	32.56	34.36	17.60

Table 5

Children's Characteristics

Cells: averages	Sons	Daughters
Distance to the parents (normalized)[a]	0.73	0.75
Years of education	7.94	8.02
Age (in years)	28.8	29.3
Leisure (normalized)[b]	0.16	0.33
Marital status[c]	0.71	0.73

[a]Between 0 and 1; 0 = closest.
[b]Between 0 and 1; 0 when full time employed, 0.5 when part-time employed, and 1 when not employed.
[c]Equal to 1 when married, 0 otherwise.

Table 6

Estimation Results for Total Home Care: Equations (15) and (16)

Dependent variable = total home care Explanatory variables [b]	Parameter estimate [a]	*t*-value
Marital status (1 = married)	**-30.05**	**-9.48**
Female	**1.62**	**3.66**
Log-income	**1.02**	**2.78**
Number of grandchildren	0.16	1.50
Sociability (number of activities)	0.23	0.86
Men:		
Age	**0.24**	**7.22**
Years of education	0.08	0.97
ADL	**3.36**	**4.59**
GALI	**1.85**	**2.45**
IADL	**7.72**	**6.93**
Severe condition	-0.49	-0.45
Mobility	**2.31**	**3.62**
Mental health	**2.31**	**1.96**
Numeracy	1.73	1.18
Reading	1.86	1.68
Women:		
Age	**0.20**	**7.14**
Years of education	0.06	0.48
ADL	**6.31**	**3.88**
GALI	**3.90**	**3.84**
IADL	**6.18**	**6.42**
Severe condition	**1.27**	**2.56**
Mobility	**2.97**	**5.36**
Mental health	**1.66**	**1.97**
Numeracy	0.69	1.70
Reading	2.36	1.48
Sons:		
Number	0.76	1.06
Distance (average)	-1.25	-1.07
Education (average)	**-0.27**	**-2.67**
Marital status (average)	0.38	0.73
Age (average)	0.09	1.73
Daughters:		
Number	0.41	0.42
Distance (average)	-0.20	-0.30
Education (average)	-0.22	-0.93
Marital status (average)	-0.63	-0.87
Age (average)	**0.13**	**2.07**
Pseudo R-squared	0.06	
Number of households	6357	

a. Parameter estimates significant at a 5% level are in bold.

b. The model includes country-specific dummy variables.

Table 7

Estimation Results for Equations (17)–(20): Relative Demand for Informal and Formal Home Care

	Share of informal care						Share of formal care	
Dependent variable	Children (%)		Relatives (%)		Friends (%)		State (%)	
Explanatory variables [b]	Parameter estimate [a]	*t*-value	Parameter estimate [a]	*t*-value	Parameter estimate [a]	*t*-value	Parameter estimate [a]	*t*-value
Log-income	**-2.31**	**-1.99**	0.81	0.71	0.51	0.64	1.00	0.90
Sociability	-0.63	-0.72	0.38	0.53	**3.06**	**2.97**	**-2.80**	**-2.33**
Married	10.19	0.97	-4.98	-1.29	13.45	1.60	-18.66	-1.38
Female	5.43	1.83	3.04	1.45	-1.39	-0.57	**-7.07**	**-2.16**
Education: Men	0.06	0.16	0.12	0.48	0.14	0.65	-0.31	-1.03
Women	**-0.93**	**-3.61**	-0.24	-0.91	**0.61**	**6.10**	**0.57**	**2.20**
Age: Men	-0.21	-1.61	0.02	0.37	**-0.26**	**-2.37**	**0.44**	**2.83**
Women	-0.08	-0.56	0.01	0.17	**-0.30**	**-3.05**	**0.37**	**2.35**
Number of grandchildren	-0.02	-0.10	0.49	2.65	-0.46	-1.61	0.00	0.00
Number of sons	**9.82**	**4.72**	-0.96	-0.77	**-4.94**	**-3.91**	-3.92	-1.48
Number of caughters	**10.90**	**4.33**	-1.33	-0.83	**-8.38**	**-3.44**	-1.19	-0.71
Age: Sons (average)	**0.41**	**3.41**	**-0.11**	**-2.27**	**-0.22**	**-3.23**	-0.08	-0.74
Daughters (average)	**0.66**	**7.04**	**-0.12**	**-2.01**	**-0.25**	**-3.45**	**-0.29**	**-3.04**
Distance: Sons (average)	**-7.01**	**-2.30**	-0.78	-0.77	**4.96**	**2.48**	2.83	0.78
Daughters (average)	**-12.41**	**-4.07**	1.41	0.84	**8.70**	**3.59**	2.30	0.93
Leisure: Sons (average)	1.78	1.20	-1.84	-1.00	1.12	0.69	-1.06	-0.53
Daughters (average)	1.19	0.39	**-2.01**	**-4.15**	1.10	0.61	-0.27	-0.13
Total hours of home care	-0.18	-0.92	**-0.24**	**-2.06**	-0.16	-1.65	**0.58**	**2.29**
Exogeneity test: sons' leisure (*p*-value) [c]	0.30		**0.05**		0.42		0.79	
Exogeneity test: daughters ' leisure (*p*-value) [c]	0.34		0.12		0.81		0.46	
Exogeneity test: total home care (*p*-value) [c]	0.06		**0.02**		0.50		**0.01**	
Overidentification test (*p*-value) [d]	0.06		0.11		0.37		**0.02**	
R-squared	0.20		0.05		0.10		0.16	
Number of households	2231		2231		2231		2231	

a. Parameter estimates significant at a 5% level are in bold.

b. The model includes country specific dummy variables.

c. Null hypothesis =exogeneity of the explanatory variable.

d. Null hypothesis = the orthoganality of the exogenous explanatory variables (instruments) to the error term (Davidson and MacKinnon, 1993).