THE ROLE OF PAID HOME CARE IN ELDERLY LIVING ARRANGEMENTS DECISIONS

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Abstract

Given the social and financial implications associated with the expected growth in the demand for Long Term Care (LTC), there is a mounting interest in understanding the determinants of family decisions regarding living arrangements of the elderly, in order to implement effective policy measures aimed at containing costs and enhance the quality of care. This paper estimates the effects of various disabled elderly and family characteristics on the choice of living arrangement and type of care. We consider over 300 households taken from representative sample of the population of the Italian region Emilia Romagna who have a disable elderly person cared either at home or in a residential arrangement. We model family choice as a two stage process, using a bivariate probit model with selectivity bias. In the first stage, the decision is between institutionalisation and home care. In the second stage, families that have kept the elderly person at home, decides whether to become the primary caregiver (informal care) or to hire paid care (formal care). In the traditional approach, informal and home care tend to coincide. Conversely, we claim that also when a dependent person is kept at home, the choice between informal and paid care is a relevant issue. In Southern Europe, Italy in particular, it is becoming more and more frequent for families to delegate to a third (paid) person the role of primary caregiver also in case of home care, thanks to significant migration flows from developing countries, mostly undocumented and illegal, with a high female component available for personal care work. Among the obtained results, we highlight the predominance for the institutionalisation decision of disability variables as opposed to family characteristics, economic variables and public services availability. In Italy, social norms about filial responsibility still tend to consider the elderly institutionalisation with a consistent amount of social stigma. In this case, the residential choice is strictly influenced by the growing functional or cognitive impairments of the elderly. In the second stage, functional status still influences the older person's amount of need for help, but in this case family characteristics, socio-economic variables and supply constraints turn to be better predictors of the choice between formal and informal care. For many Italian families, the possibility to delegate caregiving by buying services, also on the black market, contributed significantly to reduce nursing home admission rates.

Keywords

Long term care; elderly living arrangements; paid home care; bivariate probit model; sample selection.

JEL classification

C21, D13, I18

1. INTRODUCTION

According to the latest UN estimates [United Nations, 2005], Italy has the oldest population in the world due to the combination of fertility rate decline and increased life expectancy. In particular, the country is characterised, at the same time, by the highest percentage of population aged 65 or more and by the lowest percentage of population aged 15 or below. Moreover, the proportion of the oldest-old, that is people over 80, is rising, inducing a substantial growth in the demand for Long Term Care (LTC) as a consequence of the increasing number of individuals with functional or cognitive chronic impairments.

Nursing home care is costly and not always effective for the elderly wellbeing. Although in Italy most LTC is still provided in kind by unpaid informal caregivers, households are less and less likely to be in the condition to care directly for their disabled elderly family members. Changes in the age structure of the population is likely to impact on the coresidence choices of the elderly, as declining fertility rates imply a smaller number of children with whom the elderly might coreside. In addition to it, the decline in family ties which used to characterise Mediterranean countries, the increased labour-force participation of women, the availability of formal care alternatives and social welfare policies further contribute to changes in the residential decisions of families facing LTC problems.

Similar trends affect most developed countries. Given the social and financial implications associated with them, there is a widespread and growing interest in understanding the determinants of family decisions regarding living arrangements of the elderly, in order to implement effective policy measures aimed at containing costs and enhancing the quality of care. This is reflected in a growing body of literature that concentrates on the choices among different options of living arrangements, where the alternatives typically taken into consideration are continued independence, shared housing or nursing home care. A second relevant group of studies has focused more on the quantity of formal or informal care provided to the elderly. This paper builds on the existing body of research in two ways.

First, our paper extends to a different institutional setting a strand of literature where the large majority of studies relates to the United States, and whose results are not easily generaliseable to different systems. For the Italian case, we are aware of the existence of only of two studies, whose major shortcoming is the lack of information on disability which severely limits the scope of their conclusions [Wolf and Pinelli, 1980; Tomassini and Wolf, 1999]. On the contrary, our study examines living arrangements choices by Italian households using for the first time detailed information on the health conditions of the elderly person - their need for assistance with activities of daily living (ADLs) such as walking or dressing, and instrumental activities of daily living (IADLs) such as shopping and money management -, in addition to the socio-economic status of the family and on family attitudes towards current welfare state services and expenditures.

Second, we focus on an increasingly important issue, which is often disregarded in the literature: the role of paid caregiving when elderly people are assisted at home. The distinction between formal and informal care is typically based on the assumption that formal care provided by paid helpers occurs exclusively when the elderly person resides in a living assisted facility. In other words, it is taken for granted that when the disable resides at home, the burden of assistance mostly relies on adult children or other family members, so that, in the traditional approach, informal and home care tend to coincide.

Conversely, we claim that also when a dependent person is kept at home, the choice between informal and paid care is a relevant issue. In Italy in particular, it is becoming more and more frequent for families to delegate to a third (paid) person the role of primary caregiver also in case of home care. Since the late 1980s Italy, and more in general Southern Europe, experienced significant migration flows from ex-socialist countries, mostly undocumented and illegal, with a high female component that joined the informal labour market [Kofman et al., 2000]. Migration further increased in the nineties, in particular from Mediterranean African countries, and it is documented that two third of women are engaged in housework (domestic or personal care work), frequently taking the place of the adult child as primary caregiver for disabled elderly people. Such process has been favoured by the demographic and social trends previously illustrated and by the fact that social norms about filial responsibility still tend to attach a consistent amount of social stigma to the institutionalisation of the elderly. For many Italian families, the possibility to delegate caregiving by buying services on the black market, which ensured a substantial reduction in out of pocket expenditures with respect to professional services, contributed significantly to reduce nursing home admission rates.

Given the available dataset, we examine the relationship between nursing home admissions, family structure and paid home care (legal or illegal). We estimate a model of living arrangements and types of care, assuming the family choice as a two stage process. In the first stage, the decision is between institutionalisation and home care. In the second stage, families that have kept the elderly person at home, decides whether to become the primary caregiver (informal care) or to hire paid care (formal care).

Actually, avoiding to consider this phenomenon could bring to the assumption that only the presence of a spouse or of adult children is a predictor of the home choice. At this scope, by estimating a bivariate probit model with sample selection, we evaluate the effects of various disabled elderly, family and social characteristics on the choice of living arrangement and type of care. We consider over 300 households taken from representative sample of the population of the Italian region Emilia Romagna who have a disable elderly person cared either at home or in a residential arrangement.

The plan of the paper is as follows. Section 2 reviews the economic literature on elderly living arrangements. In Section 3 we discuss the empirical model and in section 4 we present the dataset used in the paper. Section 5 discusses the results of the empirical estimation. In Section 6 we conclude and discuss the main policy implications of our analysis.

2. BACKGROUND

There has been growing interest in studying family decisions regarding elderly living arrangements. The literature is predominantly empirical, although it offers also several theoretical models, varying along various dimensions. Some papers assume that family members act as though they maximise a single utility function (*common preferences*) [Becker, 1981; Kotlikoff and Morris, 1988; Hoerger et al., 1996], other papers use a game-theoretic approach and involve separate utility function for each family member (*family bargaining*) [Stern, 1995, 1996; Pezzin and Schone; 1999, Sloan et al., 1997; Hiedemann and Stern, 1999; Engers and Stern, 2002].

Most of the theoretical models include only one child in the decision process [Kotlikoff and Morris, 1988], other works consider a variable number of children, in which only one child play a role in the living arrangement decisions [Pezzin and Schone, 1999; Sloan et al., 1997], whereas others consider the simultaneous participation of all the children [Hoerger et al., 1996; Hiedemann and Stern, 1999; Engers and Stern, 2002]. These models vary along several dimensions: the type of care (formal or informal) or living arrangements considered (shared housing, live independently, nursing home), the decision for adult children to work taken jointly with elderly living arrangements [Stern, 1995, 1996; Pezzin e Schone, 1997, 1999]. Several studies found that caregivers substantially reduce their labour supply, with a large negative effects of caregiving mainly on women's labour supply [Lo Sasso and Johnson, 2002].

The empirical literature is as varied as the theoretical one. Most papers are based on nonstructural models [Boersch-Supan et al., 1990; Kotlikoff e Morris, 1988, Cutler e Sheiner, 1993; Hoerger et al., 1996; Sloan et al., 1997], even if more recent papers present results based on structural models [Hiedemann and Stern, 1999; Engers and Stern, 2002]. Most papers use cross-sectional micro data, and only a few articles use also panel data to study the dynamics of changes in living arrangements decisions [Boersch-Supan et al., 1990; Dostie and Léger, 2003]. The great majority of existing work relates to the United States, with a few exceptions relating to specific countries [Van Solinge, 1990 for the Netherlands; Davey and Patsios, 1999 and Evandrou et al., 2004 for the UK; Wolf and Pinelli, 1989 and Tomassini and Wolf, 1999 for Italy] or using data from the European Community Household Panel (ECHP) [Iacovou, 2000], although the latter data set does not contain information on institutionalised elderly.

Much of this literature has been conducted with a variety of econometric methods, but displays remarkably consistent results. Most LTC services are still provided by families and friends. Personal characteristics of both the elderly and their adult children, including age, gender, marital status, health and income are important determinants of the type of care provided by children. The greatest predictors of informal care are deteriorated health, the availability of a spouse and other family members, mainly adult daughters [Engers and Stern, 2002]. Most of the care received by the elderly is provided by one person, usually referred to as the primary caregiver [Davey and Patsios, 1999]. The price for informal care depends on the caregiver's home wage, distance from the parent and public subsidies designed to encourage informal care. Factors affecting coresidence include marital status, presence of disabilities, housing tenure, female employment

[Stern, 1995]. Elderly living alone are more likely to use formal services and to be admitted to residential care [Heiss et al., 2003]. The probability of institutionalisation is strongly affected by the deterioration of health, functional ability, the absence of a spouse and the number of adult children. Besides, living arrangements decisions are also affected by supply constraints, such as the amount of public help for home health and social services and the type of care assessments rules carried out by the local authorities. Increases in the parent's income seem to increase his probability to live independently, with a heavy use of formal care, while child income and education seem to reduce the probability of the parent being cared for by the child for the presence of work effects [Kotlikoff and Morris, 1988; Engers and Stern, 2002]. Income has also a negative influence on institutionalisation, as it appears a living arrangement of lower quality [Boersch-Supan et al.,1988] with still a consistent social stigma for the family. However, if children tend to provide helps to their parents for bequest motive [Bernheim, Shleifer and Summers, 1985], informal care can increase with the increasing of parent's wealth.

Numerous studies have examined the relationship between informal care and institutional care, but there is no consensus on whether help from family members affects nursing home admissions [Hanley et al., 1990; Boaz and Muller, 1994, Lo Sasso and Jonhson, 2002]. An important line of research concentrates on the relation between formal and informal care, trying to establish whether these two types of care are substitutes or complements. Medical advances and increased public funding for in-home and community-based services have permitted people with chronic disabilities to live longer and to receive care at home more often. Nonetheless, the increasing female participation in the labour market and the subsequent rising of the opportunity cost of informal care seem to have increased the use of formal home care services, by mean of paid helpers [Liu, Manton and Aragon, 2000]. Recent papers found that while informal and formal care may be substitutes in general, they are complements at the deteriorating of the health status [Spillman and Pezzin, 2000; Van Houtven and Norton, 2004].

In recent years, most developed countries have sought to reduce the level of public funds diverted to institutional forms of LTC, arguing that the home and other form of community based care are more able to meet the needs and preferences of frail elderly people and their families. At this regard, another important line of research studies the extent to which public subsidies for home health care reduce nursing home use or simply crowd out private informal care [Hoerger et al., 1996; Pezzin and Schone, 1997].

3.   THE ECONOMETRIC SPECIFICATION

Given the characteristics of the dataset, we assume common preferences among family members and consider that the living arrangement decision is taken once-and-for-all. Each household *i* chooses the living arrangement for the disabled elderly person who belongs to his family and we hypothesise that the decision articulates in two steps. In the first step, the household decides whether to institutionalise the dependent person in a living assisted facility (Residential Care, RC) or to provide care at home (home care, HC). For those who stay at home, in the second stage, the household decides whether to provide care directly (informal home care, IHC) or to hire a external person as primary

caregiver (paid home care, PHC). The decision tree (Fig.1) illustrates our sequential model.

At each stage t, $t=1,2$, any given household i, $i = 1, \ldots N$, has a total utility level that can be expressed as a sum of two components:

$$U_{ijt} = \beta_{jt} X_{it} + \varepsilon_{ijt} \tag{1}$$

where X_{it} is a known function of (observed) household characteristics, socio-economic and institutional variables and ε is an unobserved random component. The nature of the alternative j depends on the stage that is considered. In the first stage $j = RC, HC$, whereas in the second stage $j = IHC, PHC$. Total utility is unobservable but we can observe the living arrangement alternative chosen by the family for the disabled elderly. What is relevant for the household's decision is the difference in total utility between the two alternatives that are available at each stage.

$$y_{i1}^* = U_{iHC1}(°) - U_{iRC1}(°) = (\beta_{HC1} - \beta_{RC1})X_{i1} + (\varepsilon_{iHC1} - \varepsilon_{iRC1}) = \alpha_1 X_{i1} + v_{i1}$$
$$y_{i2}^* = U_{iPHC2}(°) - U_{iIHC2}(°) = (\beta_{PHC2} - \beta_{IHC2})X_{i2} + (\varepsilon_{iPHC2} - \varepsilon_{iIHC2}) = \alpha_2 X_{i2} + v_{i2}$$

$$\tag{2}$$

The differences in total utility are latent variables that cannot be directly observed. As far as the first stage is considered, for each household we record the actual choice between RC and HC, expressed by the following dichotomous indicator:

$$y_{i1} = \begin{cases} 1, & \textit{if } \ y_{i1}^* > 0 \quad \text{choice of Home Care} \\ 0, & \textit{if } \ y_{i1}^* \leq 0 \quad \text{choice of Residential Care} \end{cases} \tag{3}$$

In the second period, households that have kept the elderly person at home, decide whether to become the primary caregiver (IHC) or to hire paid care (PHC). Formally:

$$y_{i2} = \begin{cases} 1, & \textit{if } \ y_{i2}^* > 0 \quad \text{choice of Paid Home Care} \\ 0, & \textit{if } \ y_{i2}^* \leq 0 \quad \text{choice of Informal Home Care} \end{cases} \tag{4}$$

The decision problem that we are considering implies that data for the second stage choice are recorded only when the household chooses HC in the first period. In other

words, the choice between residential and home care works as a selection process for the second stage. Formally, (y_{i2}, x_{i2}) is observed only when $y_{i1} = 1$ and missing otherwise. Its main implication is that, while ε_{i1} is defined over the entire set of families with a disabled elderly, ε_{i2} is defined only on the sub-population for which $y_{i1} = 1$. In the empirical literature, this kind of problem is typically dealt with by assuming that the error components are drawn from a bivariate normal distribution, corrected for a sample selection, with a correlation coefficient ρ: $\varepsilon_{i1}, \varepsilon_{i2} \sim N(0,0,1,1,\rho)$ [Greene, 2003].

This gives rise to three possible observed outcomes (RC, PHC, IHC) whose unconditional probabilities are:

$$
\begin{aligned}
&y_{i1} = 1, \ y_{i2} = 1: \ \text{Prob}\,(y_{i1} = 1, y_{i2} = 1,) = \Phi_2\big[\alpha_1 x_{i1}, \alpha_2 x_{i2}, \rho\big] \\
&y_{i1} = 1, \ y_{i2} = 0: \ \text{Prob}\,(y_{i1} = 1, y_{i2} = 0,) = \Phi_2\big[\alpha_1 x_{i1}, -\alpha_2 x_{i2}, -\rho\big] \\
&y_{i1} = 0, \ \text{Prob}\,(y_{i1} = 0) = \Phi\big[-\alpha_1 x_{i1}\big]
\end{aligned}
\tag{5}
$$

where Φ and Φ_2 denote respectively the univariate and bivariate standard normal cumulative distribution functions.

This model is known in the literature as bivariate probit with sample selection and the corresponding log-likelihood function is [e.g. Van de Ven and Van Praag (1981), Meng and Schmidt, 1985]:

$$
\sum_{y_{1i}=1,\ y_{2i}=1} \log \Phi_2\big[\alpha_1 x_{1i}, \alpha_2 x_{2i}, \rho\big] + \sum_{y_{1i}=1,\ y_{2i}=0} \log \Phi_2\big[\alpha_1 x_{1i}, -\alpha_2 x_{2i}, -\rho\big] + \sum_{y_{1i}=0} \log \Phi\big[-\alpha_1 x_{1i}\big]
$$

$$
\tag{6}
$$

4. THE DATA

Our dataset consists of interviews drawn from a cross-sectional survey carried out on a sample of 1405 families of the Italian region Emilia Romagna (around 4 millions inhabitants). The survey was conducted by a professional firm through face-to-face interviews between October and December 2002. The main purpose of the survey was to elicit WTP for covering LTC expenditure risk [Brau, Lippi Bruni, Pinna, 2004] and households were selected according to a design aimed at ensuring geographic and socio-economic representativity of the sample [see Cocchi, Fabrizi, Trivisano, 2004, for a thorough discussion of the sampling strategy].

The questionnaire contains information on family composition, socio-economic status, working and health conditions of its members and on attitudes towards health and social

expenditures. Moreover, a specific section of the questionnaire is devoted to register the existence of a disabled person aged 50 or more inside the family unit, or of other disabled close relatives (parents, grandparents, etc.) even if they do not live with the respondent, i.e. they live independently, with other relatives or in a living assisted facility (nursing homes and similar). We record a total of 339 families with at least one dependent relative. However, due to missing information on some of the covariates (most of the times, family income), the sample for the empirical estimations reduces to 279 households, 231 dependent individuals live at home and 48 are institutionalised.

Table 1 reports the definitions for the variables used in the empirical model.

Our explanatory variables include characteristics of disabled elderly people and of their families and can be broadly grouped into five categories: the dependent elderly (DE) characteristics, family characteristics, economic characteristics, spatial characteristics, family opinions.

The DE characteristics are age (*age_DE*), sex (*sex_DE*), length of disability (*LTC spell*) and type of living arrangement before the disability onset (*Lived alone*). The elderly social and health conditions are captured by six ADLs (getting out of bed, bathing, dressing, eating, using toilet and walking inside) and on three IADLs (cooking, shopping and using telephone). From this kind of information, we calculated a new discrete variable used as a proxy of severe levels of disability, as it aggregates all the ADLs and IADLs that the elderly disabled is absolutely not able to carry out autonomously (*Num ADL*).

We control also for the amount of public help received by the dependent person. Public help usually works as a (partial) substitute for private care, either informal or formal. Nonetheless, public support may take very different forms, that affect the relative household choice in different ways. Since we lack of detailed information on the specific type of public support the disable elderly receives, we cannot identify the separate impact of each form of public help on the probability of opting for a particular living arrangement. Nonetheless in the current institutional framework, where public help is relatively scarce with respect to overall need, public assistance of any kind is mainly devoted to the most severe cases. Hence, we created a dummy variable taking value 1 when individuals received support for a more than 40 days in the two months before the interview (*Heavy help*). A large amount of public help can be here interpreted as an indicator of particularly critical cases (highly institutionalised). Since such severe dependency condition is likely to influence the decision between residential and home care, but not the decision between paid or unpaid home care, we include the dummy only in the first stage equation.

The second group of variables refers to family characteristics. We include a control for the number of family members (*Family size*) and a dummy indicator aimed at capturing if the residence choice of the family was influenced by the will to live close to other relatives (*Residence choice*).

Elderly care is a delicate area where social and ethical considerations strongly influence individual choices alongside more direct economic considerations. Consequently, it is

important to control, at least to some extent, for the influence of ideological priors on family decisions. For this purpose we exploited information available from the questionnaire that asked the head of the household to state which of the following statements reflected his view most closely: "*the public sector should provide LTC to everyone for the entire scope of services needed*" (*Universal access*); "*the public sector should provide fundamental LTC services to everyone and let those who desire additional care to top it up with their personal resources*" (*Need-based_access*) ; "*the public sector should provide fundamental services to low income families and the rest of the population should count exclusively on their own personal resources*" (*Means-tested access*). The latter represents our reference variable omitted from the regression.

Economic conditions are also expected to be important determinants of the elderly living arrangements and we included among the economic characteristics house ownership (*House ownership)* and net monthly family income that sums up respondent and (when present) spouse income (*Family income)*.

Home and community-based services, such as home health care, personal care, adult day care and respite care have grown in importance. From a policy perspective, the creation of a more balanced delivery system for LTC by expanding home and community-based services is a major policy goal in almost all industrialised countries. Such policy is aimed to offer appropriate levels of social and health care to enable frail elderly people to remain at home, whereas, in absence of any external support, they might otherwise require to move to an alternative care setting such as Residential, Nursing Home or long stay hospital. In particular, Local authorities play a relevant role in social care provision to older people, offering help with daily activities such as eating, bathing and dressing, but these interventions are limited to the low-income population and to elderly with severe levels of disability. Unfortunately, detailed information on local social services are not easy to be collected and for this reason we tried to use only variables referred to health services provided to disable elderly. We tried to construct several variables potentially able to capture the effects of public subsidies and policies, but none of them turned out to be significant. For instance, as in Emilia Romagna the supply of nursing home beds is limited by certificate of need (CON) regulation, we calculated the municipal ratio of nursing home beds and, as regard community care, the district ratio of patients receiving public home health care services, both for the year 2002. We also tried to consider the influence of the monthly domiciliary care allowance, provided by the region to the family willing to maintain the elderly at home, but without any particular need of justification of how this cash benefit is spent. Unfortunately, the number of users involved in these public programs remains quite limited and, owing to the micro characteristics of our data set, municipal or district information were not useful for our estimate. In order to test the hypothesis that households living in small towns and rural area still reflect a more traditional lifestyle in which home care is more prevalent [Cameron, 2000], we included two dummy variables accounting for households living in small towns, with a number of inhabitants ranging between 5000 and 25000.

Finally, an additional set of controls is included to capture household's judgements on a variety of issues concerning the nature of public intervention in the LTC sector. We introduce a dummy for the quality of existing public LTC services (*Opinion_LTC)*. In the

second set of controls households are grouped according to their preference on the best way to organise public policies for LTC. A first group collect those who support cash transfers for the primary caregiver, regardless of whether he belongs to the family or not (*Cash_Care1*). A second group collect households supporting cash transfers only if the primary caregiver is a paid person outside the family (*Cash_Care2*). The reference group omitted from the regression include households displaying a preference for in kind support. All these variables that imply personal judgements are included only in the second set of regressions (Table 2, Model B), because of potential endogeneity, since they might reflect personal experiences directly connected with the particular living arrangement the household has chosen.

5. EMPIRICAL RESULTS

In Table 2 we present estimates for the bivariate probit with sample selection whose log likelihood is expressed by [6]. Although not strictly necessary under a fully parametric approach [Wilde, 2000; Fabbri, Monfardini and Radice, 2004], the variable *Heavy help* is omitted from the second stage equation for identification purposes. We have already outlined how the intense level of public assistance captured by this indicator suggests that it identifies individuals receiving support that includes a relevant component of medical care. Since personal caregiving provided either by the family or by non professional paid helpers is a poor substitute for more highly specialised support, it reasonable to assume that the variable is a proxy for factors that do not influence the decision between informal and paid home care, whereas they influence the decision between residential and home care, since by adopting the former solution it is much easier to organise daily medical supervision than in case of home care.

Estimates of the variance covariance matrix for all the specifications presented in the paper are carried out with the Huber-White procedure to account for potential heteroschedasticity.

The null hypothesis of a correlation coefficient $\rho=0$ is not rejected according to the Wald test presented in table 2 and the result holds true for all the different specifications attempted. This is typically interpreted as an indication of independence between the two decision processes. This finding establishes that separate estimations are unbiased and ensure efficiency gains with respect to a joint estimation, which would have been necessary under non-null correlation to obtain unbiased coefficients.

In Table 3 we present the results of two separate probit equations, where the decision between RC and HC is estimated over the entire sample and the decision between IHC and FHC is estimated on the subsample of households who choose home care in the first stage. As expected coefficients and significance levels display very little variation when moving from joint to separate estimations.

A comparison between first and second stage outlines first a different importance of severity conditions. With the only exception of age that has a similar impact in the two cases, severity related variables predominantly determine the choice between residential and home care, while they play no significant role between informal and paid home care.

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As expected the more severe the dependency state, the more likely it is to observe institutionalisation and the result is consistent for all the three variables included in the estimation (age, length of disability and number of severe ADLs and IADLs).

Remarkably, gender does not display any effect in any of the estimated models. Such indication does not support conventional wisdom according to which, other things equal, women are relatively more able than men to live independently even when their health state progressively deteriorates.

Income is significant in both stages and displays the expected sign, since wealthier households have a larger probability to opt for the more costly alternatives in each stage, i.e. residential and paid home care, respectively. It is also interesting to outline that the income variable has a larger marginal impact on the decision of whether to hire a caregiver or not, rather than on the decision to institutionalise the dependent person, that were shown to depend largely on severity as well.

Differently from household income, housing tenure has no impact in any of the attempted specifications. A possible explanation is that, without additional information on the value of the house, the variable used here represents a poor proxy for family accumulated wealth, or that money flows are a more influential determinant of living arrangement decisions than stocks.

As shown by looking at the marginal effect, if people were living alone before becoming dependent their probability of ending up in a living assisted facility increase of 11% with respect to those who had some form of shared housing. Consistently with intuition, also the probability of purchasing care outside the family increases of 17%. The result is due to the fact that both the elderly person and his adult children may be reluctant to coreside (past habits, distance, problems in accommodating a new person in the house) and the personal caregiver may help the elderly staying in his own house even when his degree of self sufficiency decreases.

People currently receiving strong public support (*Heavy help*) are much more likely to be institutionalised. The marginal effect is particularly large, confirming that the variable can be interpreted as a proxy of a particularly high need of medical care. As previously discussed, the variable has been omitted from the second stage equation both for statistical and theoretical reasons. On the one hand, its omission is motivated by identification purposes, on the other hand institutional considerations suggest that the variable is not expected to have any influence on the choice between different forms of home care. Neither family members nor paid helpers usually have the professional skills to provide the specialised care required by the people captured by the dummy. Since, according to the test on the correlation coefficient ρ, the two processes are independent, we also re-estimated the second stage equation including the variable *Heavy help* on the subsample of households with $y_1=1$, and the corresponding coefficient was not significant.

Contrariwise to what it is usually suggested by theoretical and empirical literature household size is poorly significant. We also tried a dummy for the presence of a housewife, a figure that is claimed to play a crucial role in the decision to maintain the

elderly at home, but this variable performed poorly and was dropped from the final specification. We also tried different alternatives for family education levels, but none of them turned out to be significant.

A more relevant role is played by family attitudes. The variable *Residence choice* can be interpreted as a proxy of the strength of family ties Those who declared that the desire to reside close to their relatives was the most important determinant in their residence choice, are more likely to keep the elderly dependent at home. On the contrary, we observe no differences in the probability of providing care directly rather than hiring someone for this purpose. Since one may suspect endogeneity problems, if the residence choice is taken once disability has already occurred [Stern, 1995], we also tried different specifications that did not include households whose choice of residence was specifically influenced by the dependency status of one of their relatives. These observation were in one case dropped from the sample and in the other coded as zeros instead of ones. In both occurrences, the coefficients were robust to the change in specification.

6. CONCLUSIONS

In this paper we estimate the effects of various individual and family characteristics on the choice of living arrangement and type of care for dependent elderly people. Besides providing new empirical evidence that substantially improves the accuracy of available data concerning the Italian case, the main methodological contribution of the paper is that it explicitly considers the possibility for families to hire paid helpers in order to provide home care as a substitute for informal care or institutionalisation of the disabled elderly. We model family choice as a two stage process. In the first stage, the decision is between institutionalisation and home care. In the second stage, families that have kept the elderly person at home, decide whether to become the primary caregiver (informal care) or to hire paid care (formal care).

In the traditional approach, informal and home care tend to coincide, disregarding the actual role of paid caregiving when the elderly person is assisted at home. One of the peculiar features of welfare systems that characterise Mediterranean countries, is the particularly intense involvement of women in both elderly and child care. However, because of the increasing female participation in the labour force, it is becoming more and more frequent for families to delegate to a third person the role of primary caregiver also in case of home care. A similar trend puts important issues at the forefront of the policy agenda: the degree of substitutability/complementarity between formal and informal care, the nature of the job market developed for meeting demand of home care services, often poorly regulated when not illegal, as well as equity problems related to the role of household socio-economic status in determining access to care, just to quote a few of them.

The empirical evidence proposed by the paper provides insights on some of these issues. In particular, in order to understand how to design policy measures that favour an appropriate allocation of resources among the different types of care, it is crucial to

properly identify the determinants of household decisions over residence and caring arrangements when facing disabilities.

First of all, our empirical results highlight that the severity of disability plays a major role in the decision of whether or not institutionalise the disabled elderly, as opposed to family characteristics, economic variables and public services availability.

In the second stage, assisting elderly dependent people by means of formal care is an increasingly followed strategy also when families opt for the home care solution. Due to the recent demographic and socio-economic transformation in OECD countries, an elderly patient is less able to rely upon an adult child for informal care. Our analysis suggests that functional status still influences the older person's amount of need for help, but the previous elderly living alone, family size, family income and family attitudes turn to be better predictors of the choice between formal and informal care.

At this regard, two results seem particularly worth mentioning. First, the lack of traditional family unpaid care givers – captured in particular by the variable *lived alone* - forces the family to prefer to spend out-of-pocket for the services of paid professionals, instead of delegating the elderly care to the nursing home. Second, economic status produces a larger impact on the decision of whether to hire a caregiver or not rather than on the decision to institutionalise the elderly. Our results suggest that in Italy social norms about filial responsibility still tend to consider the elderly institutionalisation with a consistent amount of social stigma and the institutionalisation of the elderly is the choice of last resort, adopted only when his growing functional or cognitive impairments does not allow to maintain the home care option. Besides, with the ongoing transformation of the Italian family, the overall level of informal caregiving seems destined to be significantly reduced or even entirely replaced by a third person that provides formal services living with the elderly at home 24 hours a day.

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APPENDIX

Figure 1. A bivariate probit model with sample selection.
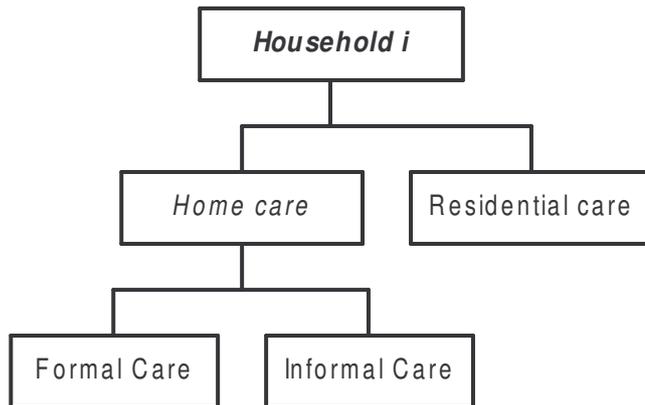
Table 1. Definitions of variables

Variable	Definition
DE characteristics	
Age_DE	Age of DE in years
Sex_DE	= 1 if DE is a female
LTC spell	Spell of disability in years
Lived alone	= 1 if DE lived alone before disability
Num ADL	Number of ADLs and IADLs in which DE is not self-sufficient
Heavy help	Public support for > 40 days
Family characteristics	
Family size	Number of family members of PR
Residence choice	= 1 if PR's residence choice was influenced by the will to live close to other relatives
Universal access	Public sector should provide universal coverage for LTC
Need-based access	Public sector should provide fundamental LTC
Economic characteristics	
House ownership	= 1 if PR and his family have the house ownership
Family income	Family income in Euro (PR+ PR spouse, if present)
Spatial variables	
Towns < 25.000	= 1 if PR lives in a town with less than 25.000 inhabitants
Towns > 5.000	= 1 if PR lives in a town ranging between 5.000 and 25.000 inhabitants.
Family opinions	
Opinion_LTC	= 1 if PR declared a bad judgement for the quality of existing public LTC services
Cash Care 1	=1 if PR supports cash transfer to the family without justification of how the benefit is spent
Cash Care 2	=1 if PR supports cash transfer to the family only for external paid helper

PR = person responding to the survey

DE = disabled elderly

Table 2. Probit model with sample selection (Joint Estimation , Models A, B)

	Coef.	Std. Err.	Coef.	Std. Err.
Care home	MODEL A		MODEL B	
AGE DE	−.0285	.0089***	−.0269	.0093***
Sex DE	.0468	.2292	.0214	.2286
LTC spell	−.0248	.0084***	−.0227	.0081***
Lived alone	−.5009	.2444**	−.5905	.2523**
Heavy help	−1.1483	.2667***	−1.0250	.2790***
Num ADL	−.1704	.0456***	−.1803	.0455***
Family size	.0679	.0872	.0761	.0888
Residence choice	.7215	.2752***	.7826	.2638***
Universal access	−.2986	.3063	−.3313	.3075
Need-based access	−.0755	.3188	−.0886	.3287
House ownership	.3159	.2722	.3299	.2716
Family income	−.0002	.0001**	−.0002	.0001***
urb5_25	−.3296	.2184	−.2743	.2271
urb_inf5	−.4190	.4867	−.4518	.4585
Opinion_LTC			.2887	.2430
Cash care 1			.0343	.2303
Cash care 2			−.0434	.3161
Constant	4.447	.9226***	4.2525	.9236***

Paid Home care				
AGE DE	.0224	.0089**	.0254	.0097***
Sex DE	.3595	.2337	.2798	.2458
LTC spell	.0065	.0099	.0024	.0094
Lived alone	.5140	.2751*	.4959	.2816*
Num ADL	−.0137	.0552	.0042	.0555
Family size	−.1132	.0934	−.1727	.1028*
Residence choice	−.2063	.2608	−.3526	.2816
Universal access	−.4643	.2663*	−.6332	.2956**
Need-based ac	−.5614	.2883**	−.7513	.3144**
House ownership	.1448	.2817	−.0200	.2870
Family income	.0004	.0001***	.0004	.0001***
urb5_25	−.3282	.2257	−.5288	.2470**
urb_inf5	−.8385	.6181	−.9830	.4922**
Opinion_LTC			−.3207	.2336
Cash care 1			−.3556	.2536
Cash care 2			.9306	.3296***
Constant	−3.1204	.8593***	−2.6541	.9400***
rho	.3724	.5740	.3229884	.5085
Log pseudo likelihood	−196.5156		−186.5766	
Sample size 279				

*** p-value < 0.01   ** p-value < 0.05   * p-value < 0.10

Table 3. Probit model (separate estimation), Model A

	Coef.	DF/dx	Std. Err.
Care home			
AGE DE	−.0298	−.00543	.0087***
Sex DE	.0327	.00601	.2323
LTC spell	−.0246	−.00449	.0084***
Lived alone	−.5063	−.10837	.2404**
Heavy help	−1.1353	−.31912	.2717***
Num ADL	−.1699	−.03098	.0449***
Family size	.0690	.01259	.0872
Residence choice	.6787	.09725	.2717***
Universal access	−.2726	−.05024	.2933
Need-based access	−.0628	−.01161	.3143
House ownership	.3152	.06463	.2722
Family income	−.0002	−.00004	.0001*
urb5_25	−.3343	−.06406	.2168
urb_inf5	−.4334	−.10440	.4659
Constant	4.5217		.9306***

Wald chi2(14)	56.80	Prob > chi2	0.0000
Log pseudo likelihood	−97.5970	Pseudo R2	0.2381
Sample size	279		

	Coef.	DF/dx	Std. Err.
Paid Home care			
AGE DE	.0252	.00632	.0082**
Sex_DE	.3607	.08455	.2344
LTC spell	.0093	.00233	.0091
Lived alone	.5767	.16646	.2562**
Num ADL	−.0077	.00192	.0458
Family size	−.1255	−.03138	.0934
Residence choice	−.2697	−.06282	.2591
Universal access	−.4648	−.11422	.2679*
Need-based access	−.5794	−.13186	.2864**
House ownership	.0797	.01945	.2793
Family income	.0005	.00011	.0001***
urb5_25	−.3123	−.07507	.2274
urb_inf5	−.8116	−.13628	.6275
constant	−3.3054		.8050***

Wald chi2(14)	54.94	Prob > chi2	0.0000
Log pseudo likelihood	−99.0769	Pseudo R2	0.1858
Sample size	231		

*** p-value < 0.01   ** p-value < 0.05   * p-value < 0.10