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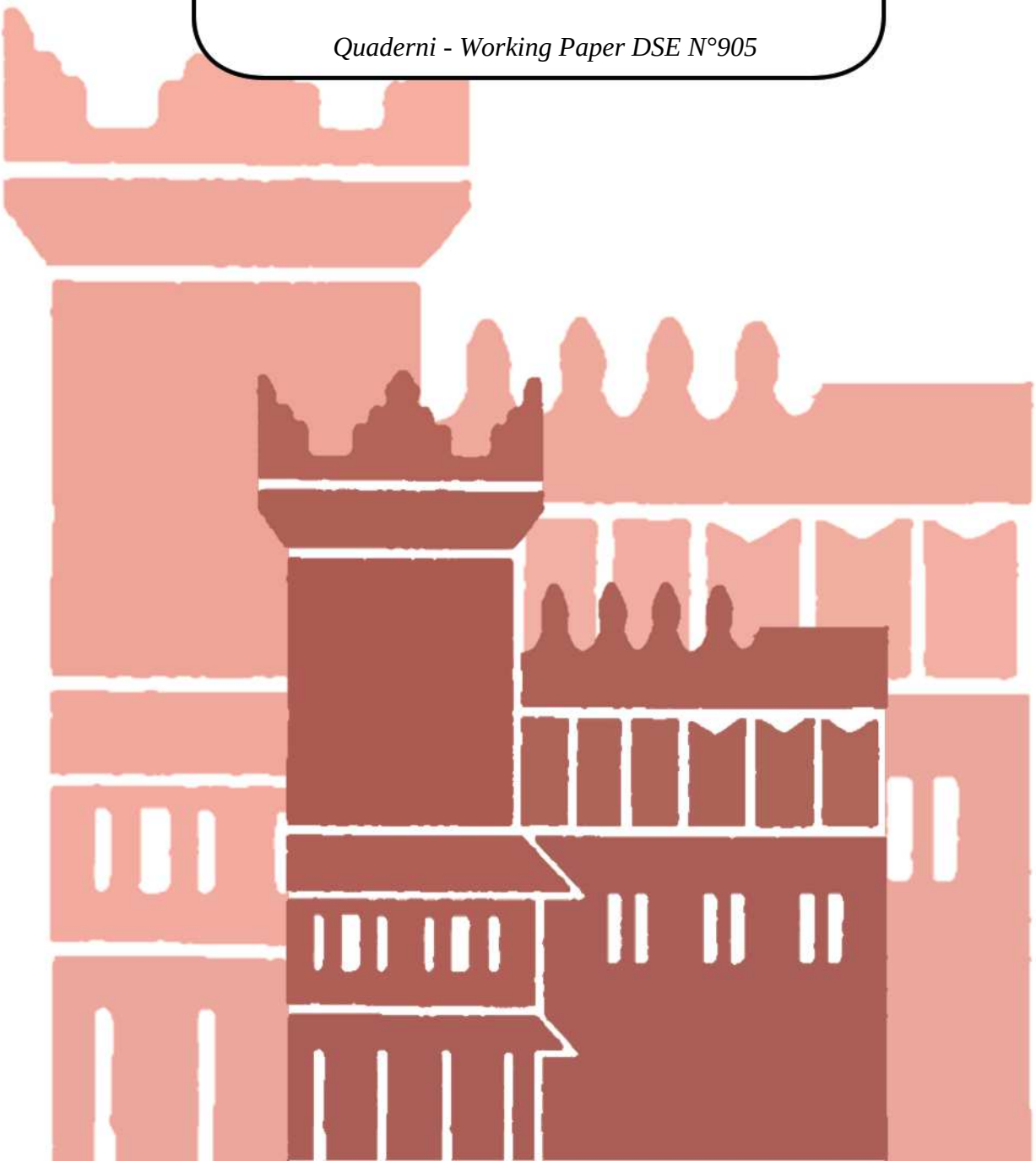

Delegating home care for the elderly to external caregivers?

An empirical study on Italian data.

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Abstract

We study care arrangement decisions in Italy, where families are increasingly delegating the role of primary caregiver to external (paid) people also for the provision of home care. We consider a sample of households with a dependent elderly person cared for either at home or in a residential home, extracted from a survey representative of the population of Italy's Emilia-Romagna region. We investigate the determinants of a household's decision to opt for one of the following three alternatives: the institutionalisation of elderly family members, informal home care, or paid home care. We estimate two model specifications, based on a simultaneous and a sequential decision process respectively, the results of which are fairly consistent. Disability related variables, rather than family characteristics, emerge as the main determinants of institutionalisation. On the other hand, household characteristics and socio-economic variables are more influential when it comes to choosing between informal and formal home care provisions.

Keywords
Long-term and social care; elderly living arrangements; informal care; household choice; health economics.

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1. INTRODUCTION

According to UN estimates (United Nations, 2012), Italy has one of the oldest populations in the world, and this is due to declining fertility and increased life expectancy. With an increasing percentage of the population being constituted by the over-80s, the demand for Long Term Care (LTC) is expected to increase even further in coming years, as a consequence of the increasing number of individuals with chronic functional or cognitive impairments.

LTC financing and provision result from the interaction between three main institutions: the family, the market and the State (Cremer, Pestieau and Ponthiere, 2012). Various measures can be adopted, each with its strengths and weaknesses: public coverage, private insurance or out-of pocket payment on the financing side; residential or home care, formal or informal assistance, on the provision side. It has now been recognised that cultural factors and the societal context may also affect households' decisions. In Europe a "north-south gradient" has been identified, with Nordic countries favouring State support and generous home care services, resulting in a considerable degree of formal care, while a mix of formal and informal care prevails in Continental Europe, and Mediterranean countries remain largely dependent on informal care (Suanet et al., 2012).

Although in Italy most LTC is still provided by informal caregivers within the family, households face increasing difficulty in ensuring the levels of assistance the elderly population requires, due to changes in the size and composition of households. Moreover, care provision is also challenged by declining family ties, the increased presence of women in the labour force, and the availability of formal care alternatives. Similar trends can be seen in most developed countries, and as such have raised an intense debate over the

determinants of living and care arrangements for the frail elderly population, designed to shape policies capable of curbing increasing LTC costs, and of enhancing the quality of assistance.

Since the Eighties, Italy has experienced significant flows of immigrants coming in from former socialist countries, most of whom illegal, with a high female component bolstering the ranks of the unofficial labour force (Kofman et al., 2000). Immigration has further increased in recent years, in particular from Mediterranean African countries, and there is documentary evidence of the fact that two thirds of such women are engaged in housework (domestic or personal care work), frequently replacing the adult child as a household's primary caregiver. This process has been witnessed in all southern European countries, where elderly care has traditionally been centred on a family-based model; in fact, these countries are now the recipients of a flow of increasingly feminized migration, leading to the transition from a "family" model of care to one based on the contribution of the "immigrant in the family" (Bettio et al., 2006). Italy is a noteworthy case where empirical evidence indicates that the country is characterised by the highest ratio of female immigrants active in the personal care sector (Bettio et al., 2006; Simonazzi, 2009). This process has been favoured by ongoing socio-demographic trends and by a public benefit system largely based on unconditional monetary transfers, in-kind public services that are largely insufficient to cover existing needs, and social norms governing filial responsibility that attach social stigma to the institutionalisation of the elderly. For many Italian families, the opportunity to purchase care services in a poorly regulated personal services market, largely based on unskilled female immigrants workforce (Villosio and Bizzotto, 2011), has ensured a low-cost substitute for professional home care services, and at the same time has

mitigated the demand for admissions to assisted living facilities. The emerging model entails a division of responsibilities whereby the family retains the role of supervisor and coordinator of the whole process, while the task of directly assisting the frail elderly person is delegated to a round-the-clock (privately paid) unskilled caregiver with the public authorities acting as residual providers for health and paramedical services when needed.

Our paper examines the determinants of living and care arrangements for frail elderly adults in terms of three mutually exclusive alternatives: admission to an assisted living facility, informal home care or paid home care. We employ two different specifications in order to analyse the factors associated with household's choice. In the first one, the three options are modelled as simultaneous, whereas in the second one the household's decision is modelled as a sequential process. In the first stage, the family chooses whether to institutionalise the elderly dependent or to assist him at home, while in the second stage, conditional on having opted for home care, households choose between informal and paid home care. We estimate multinomial and two-step discrete choice models to evaluate the impact of personal, household and local characteristics on living and care arrangement for older member of the family suffering of functional limitations in daily activities. The data are taken from a survey of 1400 households of the population of the Italian region Emilia-Romagna, around 300 of whom include (at least) one dependent elderly person.

The layout of the paper is as follows. Section 2 examines the relevant literature. In Section 3 we illustrate the estimation strategy, while the dataset is presented in Section 4. Section 5 discusses results and policy implications, and Section 6 offers a summary and the main conclusions.

2. BACKGROUND

In the last two decades, a growing number of theoretical and empirical studies have improved our understanding of household decisions on how to assist the elderly in need of regular help due to physical/mental impairment and limitations in daily activities.

From the theoretical perspective, the main distinction is between those approaches that hypothesise common preferences within the household, and those that incorporate forms of family bargaining (Pezzin, et al., 2007; Byrne et al., 2009). In the latter case, strategic interaction can be motivated by altruism, or by the desire to protect future bequests (Bernheim, et al., 1985; Courbage and Eeckhoudt, 2012), and usually involves the elderly parent and one child only, although certain studies also allow for the potentially divergent views of adult siblings (Hiedemann and Stern, 1999; Engers and Stern, 2002).

Despite the challenging theoretical issues raised by inter- and intra-generational relations, in contexts where altruism, cultural attitudes, and moral and legal obligations interfere with economic motives, literature continues to be mainly empirically oriented, covering a wide array of topics. Seminal papers (including Kotlikoff and Morris, 1988; Boersch-Supan et al., 1988, 1990; Heiss et al., 2003; Dostie and Léger, 2005) used micro-data to study the determinants of decisions regarding the living arrangements of the elderly and their trajectories over time. The main objective of such studies has been to empirically assess to what extent demographic and socio-economic characteristics, health conditions and public policies, affect the choice between independent living, shared housing or admission to a nursing home. A second area of investigation focuses on the mutual interaction between the elderly's living arrangements, care provision, and the labour market participation of adult

children (e.g. Ettner, 1996; Pezzin and Schone, 1997, 1999; Byrne et al., 2009; van Houtven et al., 2013).

However, research has tended to focus on the analysis of the factors affecting the choice of type of care, and the interaction between such factors. Since most LTC continues to be provided by families, kin and friends, it is informal care that has been subjected to the closest scrutiny. The personal characteristics of both the elderly and their adult children, including age, gender, marital status, health and income, emerge as important determinants of the type of care provided by adult children.

The core of such debate is the analysis of the relationship between formal and informal care, with the purpose of establishing whether these two types of care are substitutes or complements (van Houtven and Norton 2004; Sarma and Simpson, 2007; Hanaoka and Norton, 2008; Lee and Kim, 2012). Although the nature of the relationship is still controversial, existing evidence would suggest that while informal and formal care tend to be substitutes, they do complement one another in cases of severe disability, where formal care requires highly-skilled nursing and medical services. A complementary approach has also investigated whether public home care subsidies reduce nursing home use, or simply crowd out informal care (Hoerger et al., 1996; Pezzin and Schone, 1997). The main question is whether these subsidies affect co-residence (Orsini, 2010), which often reflects macro-structural factors as well and is viewed as a reaction to economic insecurity and social uncertainties (Isengard and Szydlik, 2012). Moreover, a number of studies has specifically focused on the relationship between informal and institutional care and they do not always agree on whether help from family members affects nursing home admissions

(Hanley et al., 1990; Boaz and Muller, 1994; Lo Sasso and Johnson, 2002; Paraponaris et al., 2012).

This mixed evidence probably depends on the various institutional contexts examined, on the limited available data, and most importantly of all, on the multidimensional nature of LTC , which results in complex patterns of response to LTC needs.

Partly due to the difficulties in collecting detailed information regarding older adults assisted at home, in the past formal care has frequently been associated exclusively with assistance in nursing homes, or with in-kind public services, whilst neglecting the role of privately paid caregivers who assist the frail elderly in their homes. More recently, however, richer sources of data together with the increased importance of the issue in policy terms, following the development of community-based care and the reduction in the potential for informal care within families, have encouraged a more precise consideration of formal care provided at home (Bolin et al., 2008; Bonsang, 2009; Paraponaris et al., 2012; Balia and Brau, 2013).

One of the main limitations of these studies is that they mainly use surveys covering only the elderly population living in the community, but not those individuals living in institutions. We contribute to fill this gap by jointly studying the determinants of elderly living arrangements and of home care solutions, and by including the institutionalised elderly in our analysis.

A second contribution is that while several studies have incorporated societal values and cultural factors in the analysis of care provision, and have proven important at the national level (Bolin, 2008; Suanet et al., 2012; Di Novi et al. 2013), cultural views at the household level can be equally relevant but tend to be overlooked owing to a lack of

adequate information. We, on the contrary, are able to take advantage here of a unique survey that includes questions reflecting both households' views on the best way to organise and finance LTC services, and the strength of family ties. Thanks to this information, we can directly test the impact of such factors on households' decisions, while at the same time reducing unobserved heterogeneity vis-à-vis the main drivers of households' decisions.

Third, we study a country which despite those distinctive features previously discussed, has received relatively little attention in the literature so far. Earlier works – including Wolf and Pinelli (1980); Tomassini and Wolf (2000); Tomassini, Wolf and Rosina (2003) – while providing an interesting picture of living arrangement decisions, lacked any detailed information on the magnitude of the functional limitations of the scope of the conclusions. More recently, Broese et al. (2006) investigated the question of socio-economic inequalities in the use of formal care, but they did not observe informal help provided within the household, while Lippi Bruni and Ugolini (2006) use the same dataset employed in the present paper, but only considered the distinction between nursing home and community care, neglecting to analyse the choice between informal and paid home care, which is one of the focal points of the present study.

3. THE ECONOMETRIC SPECIFICATION

The purpose of our empirical analysis is to jointly estimate living arrangement decisions (residential vs. home care) and those decisions concerning the type of care (formal vs. informal care). Given the cross-sectional nature of our data, we assume common preferences among family members, and decisions taken once-and-for-all. However, since

there is no unique way of describing the household decision-making process, we consider two alternative specifications for our reduced form equations: a simultaneous choice (Fig. 1) among three non-ordered, mutually-exclusive alternatives (admission to an assisted living facility, informal care or paid home care); and a sequential choice where the alternatives are residential or home care at the first stage, and informal or paid care at the second stage, the latter choice being conditional on the family's having previously opted for home care (Fig. 2):

INSERT FIGURE 1 AND FIGURE 2

3.1 The simultaneous decision process

We define U_{ij} the utility of household *i, i = 1, …N,* that chooses type of care *j*:

$$U_{ij} = \beta_j X_i + \varepsilon_{ij} \qquad j = 1,2,3 \qquad (1)$$

where X is a vector of (observed) demographic, socio-economic and health characteristics of the household and of the elderly dependent person, which also includes area variables and the household's opinions on the organisation of LTC services; ε is the (unobserved) error component. Control variables are common across alternatives, and the decision tree (Fig. 1) illustrates the simultaneous decision between: Residential Care (RC), Informal Home Care provided by family members or friends (IHC), and Paid Home Care provided by an external caregiver (PHC). The probability of choosing alternative *j* is :

$$P(d_{ij}) = \begin{cases} 1, & if \quad \mathrm{P}(U_{ij} > U_{ik}), \quad \forall \mathrm{k} \neq \mathrm{j} \\ 0, & otherwise \end{cases} \qquad (2)$$

This is often estimated using a MultiNomial Logit (MNL) model which assumes that household *i* compares the indirect utility of each arrangement *(j=1…3)* and selects the one guaranteeing the highest utility:

$$
\begin{aligned}
d_{ij} &= 1 \text{ if } \beta_1' X_i + \varepsilon_{i1} > (\beta_2' X_i + \varepsilon_{i2}, \beta_3' X_i + \varepsilon_{i3}) \\
d_{ij} &= 2 \text{ if } \beta_2' X_i + \varepsilon_{i2} > (\beta_1' X_i + \varepsilon_{i1}, \beta_3' X_i + \varepsilon_{i3}) \\
d_{ij} &= 3 \text{ if } \beta_3' X_i + \varepsilon_{i3} > (\beta_2' X_i + \varepsilon_{i2}, \beta_1' X_i + \varepsilon_{i1})
\end{aligned} \qquad (3)
$$

where parameters β_1, β_2 and β_3 are estimated in terms of maximum likelihood. One shortcoming of the MNL model is that it relies on the Independence of Irrelevant Alternatives (IIA), which requires that the ratio of the probabilities of choosing any two alternatives is independent of the availability or attributes of other alternatives (Cheng and Long, 2007). Because of this, the MNL specification may appear inappropriate in this context, where two of the three alternatives are potentially perceived as close substitutes since both imply provision of care at home, whereas the third option implies the institutionalisation of the elderly person. One way to address the problem is to estimate a multinomial probit model (MNprobit) (Hoerger et al., 1996), where the random error term ε follows a multivariate normal distribution with a variance/covariance matrix Σ not restricted to be diagonal. In this case, the normalisation hypotheses permits identification of the model and, at the same time, relaxation of the IIA property.

3.2 The sequential decision process

An alternative way of accommodating the fact that home-based solutions may be perceived as close substitutes, is to model the decision in two stages. Firstly, the household chooses whether to place the dependent elderly person in an assisted living facility (Residential

Care, RC), or to provide care at home (Home Care, HC). Those families who opt for home care may then choose between Informal Care (IHC) and Paid Home Care (PHC). The decision tree (Fig.2) illustrates the sequential model.

At each stage, total utility for household *i* is expressed as the sum of two components, $\beta_j X_i$ and ε_{ij}, as in (1). The main difference lies in the set of available alternatives *j* which now differs from one stage to the next (*j = RC, HC,* at stage 1; *j = IHC, PHC* , at stage 2). Total utility is unobservable, but we can observe families' choices concerning the type of care. Again, what is important for a household is the difference in total utility between the available alternatives at each stage, as reported in (4):

$$\begin{aligned} y_{i1}^{*} &= U_{iHC1}(\circ) - U_{iRC1}(\circ) = (\beta_{HC1} - \beta_{RC1}) X_{i1} + (\varepsilon_{iHC1} - \varepsilon_{iRC1}) = \alpha_1 X_{i1} + v_{i1} \\ y_{i2}^{*} &= U_{iPHC2}(\circ) - U_{iIHC2}(\circ) = (\beta_{PHC2} - \beta_{IHC2}) X_{i2} + (\varepsilon_{iPHC2} - \varepsilon_{iIHC2}) = \alpha_2 X_{i2} + v_{i2} \end{aligned} \tag{4}$$

The differences in total utility can be represented as latent variables, and the information used to estimate the first-stage equation is drawn from the actual choice between RC and HC, as expressed by the dichotomous indicator y_{i1}:

$$y_{i1} = \begin{cases} 1, \ if \ \ y_{i1}^{*} > 0 & \text{choice of Home Care} \\ 0, \ if \ \ y_{i1}^{*} \le 0 & \text{choice of Residential Care} \end{cases} \tag{5}$$

At the second stage, those households that have chosen to keep the elderly person at home, then decide whether to act as the primary caregiver (IHC), or to hire a paid caregiver (PHC):

$$y_{i2} = \begin{cases} 1, \ if \ \ y_{i2}^{*} > 0 & \text{choice of Paid Home Care} \\ 0, \ if \ \ y_{i2}^{*} \le 0 & \text{choice of Informal Home Care} \end{cases} \tag{6}$$

The sequential model implies that the second-stage decision only arises in the case of those households that previously chose HC, while the first-stage decision can be seen as a selection process, that is y_{i2}, is observed only if $y_{i1} = 1$, whereas information is missing otherwise. The main implication is that while ε_{i1} is defined over the entire set of observations, ε_{i2} is only defined in regard to the sub-population for which $y_{i1} = 1$. A natural way to tackle the problem is to assume that the error components are drawn from a bivariate normal distribution, corrected for a sample selection with correlation coefficient ρ: $\varepsilon_{i1}, \varepsilon_{i2} \sim N(0,0,1,1,\rho)$ (Greene, 2011). This gives rise to three possible outcomes (RC, PHC and IHC), the unconditional probabilities of which are:

$$\begin{aligned} &y_{i1}=1,\ y_{i2}=1:\ \text{Prob}\,(y_{i1}=1,y_{i2}=1,)=\Phi_2[\alpha_1 x_{i1},\alpha_2 x_{i2},\rho] \\ &y_{i1}=1,\ y_{i2}=0:\ \text{Prob}\,(y_{i1}=1,y_{i2}=0,)=\Phi_2[\alpha_1 x_{i1},-\alpha_2 x_{i2},-\rho] \\ &y_{i1}=0,\ \text{Prob}\,(y_{i1}=0)=\Phi[-\alpha_1 x_{i1}] \end{aligned} \qquad (7)$$

where Φ and Φ_2 respectively denote the univariate and bivariate standard normal cumulative distribution functions. This corresponds to a bivariate probit with sample selection (Van de Ven and Van Praag, 1981; Meng and Schmidt, 1985) with log-likelihood function:

$$\sum_{y_{1i}=1,\ y_{2i}=1}\log\Phi_2[\alpha_1 x_{1i},\alpha_2 x_{2i},\rho]+\sum_{y_{1i}=1,\ y_{2i}=0}\log\Phi_2[\alpha_1 x_{1i},-\alpha_2 x_{2i},-\rho]+\sum_{y_{1i}=0}\log\Phi[-\alpha_1 x_{1i}] \qquad (8)$$

Estimates of the variance covariance matrix are carried out by following the Huber-White procedure in order to account for potential heteroschedasticity.

4. THE DATA

The study is based on a survey, carried out in 2002, of 1,405 families in the Emilia-Romagna region of Italy, with its 4 million inhabitants. The survey was conducted by a professional firm, and involved personal interviews. Its main purpose was to elicit willingness to pay for coverage of the LTC expenditure risk (Brau and Lippi Bruni, 2008; Brau et al., 2010), and the sample was selected to ensure geographic and socio-economic representativity of the population (Cocchi et al., 2004).

The questionnaire contained information on household composition, socio-economic status, employment and health conditions, and on attitudes towards financing health and social care. Moreover, a specific section recorded the presence of family members aged 50 and over in need of regular assistance, including close relatives of the respondent (parents, grandparents, etc.) living in the community or institutionalised. Thus the survey gathered information on family members experiencing limitations in their daily activities, not only if they lived with the respondent but also if they lived independently, either with other family members or in an assisted living facility. The information on admissions to residential facilities, and on the identity of primary caregiver for the elderly dwelling in the community, enables us to estimate the determinants of both living and care arrangements. Although LTC provision can involve different players at one and the same time (nurses, skilled and unskilled personal caregivers, family members, friends etc.), there is evidence in the literature that the majority of care for the elderly is provided by one specific person (Davey and Patsios, 1999). This is true in particular of Mediterranean countries, where a mix of formal and informal care is less frequently observed than in Continental European

and Nordic countries (Suanet et al. 2012). Therefore, within our context the identity of the primary caregiver strongly affects the type of care provided.

We recorded data for 339 households with at least one dependent elderly person. However, missing information regarding some of the covariates (in most cases household income) left us with 279 observations to be used for our empirical analysis, with 231 dependent individuals living at home and 48 living in institutions. Table 1 reports the variables used in the empirical model and the associated descriptive statistics.

The control variables can be broadly grouped into five categories: characteristics of the dependent elderly person (DE), demographic characteristics of the household, economic characteristics of the household, local area characteristics, and the head of the household's opinions on the best way to finance and organize LTC services.

DE characteristics are: age (*age DE)*, gender (*Female DE)*, length of disability (*LTC spell)* and a dummy taking value 1 for those who lived alone before the onset of disability (*Single Living)*. Unlike most other surveys, the latter variable above does not express the living condition at the time of the interview, but it describes the situation when the elderly person in question was still in good health. This rules out the possibility of the observed residence status being the result of a response to the development of physical/mental impairments which would render the regressor potentially endogenous (Mentzakis et al., 2009).

Difficulties in performing daily activities are measured in terms of six ADLs (getting out of bed, washing, dressing, eating, using the toilet and walking inside) and three IADLs (cooking, shopping and using the telephone). Following the literature (Bolin et al., 2008; Byrne et al., 2009; Paraponaris et al., 2012 among others), we proxy the magnitude of disability with a count variable expressed by the sum of ADLs and IADLs a frail person

needs help with (*Num ADL*). We also include a separate control for preparing meals (*Cooking meals*), an important indicator of individual autonomy as it implies the capacity to plan meals, gather ingredients, open cans and jars and use kitchen equipment safely. Such abilities denote a relatively high degree autonomy, and this item is the only one that displays a separate significant effect after controlling for the number of ADLs and IADLs the person is unable to perform autonomously.

We also consider the amount of public help received by the DE. Public help usually constitutes a (partial) substitute for private care, either informal or formal. Nonetheless, such support may take very different forms. Since we lack detailed information on the specific type of public support received by the elderly, we cannot identify the separate impact of each form on the probability of a given caring arrangement being chosen. However, within the Italian institutional framework, in-kind public assistance is scarce and tends to be concentrated on the most severe cases. Consequently, recipients of substantial public assistance are usually those affected by extremely severe conditions. Hence, we include a dummy for individuals who received support for 40 days or more during the two months prior to the interview (*Heavy help*), which is expected to comprise persons with very severe disabilities.

The second set of variables refers to household characteristics, and includes *Household size* and the share of family members who are aged 65 and over (*elderly ratio*). Furthermore, we account for the characteristics of the head of the household, such as age and chronic diseases.

Economic conditions are potentially important determinants of care arrangements. Our survey provides information on whether the household owns its home (*House ownership)*,

and on net monthly household income, that is, the sums of the respondent's net income and (when present) that of the spouse (*Household income)*. For our purposes, household income has several advantages over individual indicators. Firstly, it is consistent with the common preferences assumption according to which LTC decisions are mainly taken at household level. Secondly, it is relatively less influenced in case the respondent is also the main caregiver and therefore reduces the risk of endogeneity of the regressor (Mentzakis et al., 2009).

Living and care arrangements are potentially influenced also by the urban/rural area in which the family live, and to control for this we have included two dummy variables for households living in towns with less than 5,000 inhabitants, and in towns with more than 25,000 inhabitants; towns with between 5,000-25,000 inhabitants have been taken as the reference case.

Moreover, family choices may also be influenced by supply constraints, such as the amount of public help for home health and social services provision, and the type of care assessment rules adopted by the local authorities. The importance of such services has grown over time, but in our context they are limited to low-income or severely disabled cases, and precise information on local social services is not readily accessible. We constructed several variables to capture the effects of public policies at local area level, but none of them turned out to be significant. For instance, as the supply of nursing home beds is subject to a certificate of need (CON) regulation, we calculated the municipal ratio of nursing home beds and, as regards community care, the share of patients receiving public home health care services at the district level. We also considered monthly domiciliary care allowances provided to families willing to keep the elderly at home. None of these controls

influenced our estimates, probably because the actual recipients of these programs are of a limited number, and there is little heterogeneity across areas.

Finally, an additional set of controls is included to capture households' opinions on the nature of public intervention in the LTC sector. In the area of care for the elderly, cultural and ethical views can be important determinants of household decisions alongside socio-economic factors, and controlling for them may improve estimates by reducing unobserved heterogeneity across respondents. We use survey information concerning which of the following statements best reflects the head of the household's view: "*the public sector should provide LTC to everyone for the entire scope of services needed*" (*Universal access*); "*the public sector should provide basic 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 basic LTC services only 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 case, which is omitted from the regression.

The second set of controls investigates preferences over the design of public policy on LTC. The first group consists of households who prefer cash transfers, regardless of whether the caregiver is a member of the family or not (*Cash_Care1*). A second group identifies the households that support cash transfers only if the primary caregiver is a paid person outside the family (*Cash_Care2*). The reference group includes households that prefer in-kind support. Finally, we introduce a dummy designed to capture whether the family's decision as to where to live was influenced by their desire to be close to other relatives (*Residence choice)*. All variables implying personal judgement have been included

in the second set of regressions only (Model B), since they might reflect personal experiences directly connected with the particular living arrangement chosen by the household.

5. RESULTS

5.1 Simultaneous choice models

Table 2 presents the MNL estimates where the decision across the three alternative arrangements is assumed to be simultaneous. As choice set partitioning tests, we performed the Hausman and McFadden test (1984) which indicates that with regard to our data, the IIA hypothesis cannot be rejected. However, since the literature outlines possible problems with the power of this test, which sometimes supports the validity of the IIA hypothesis even in cases where such may be problematic (Long and Freese, 2005; Cheng and Long, 2007), we also estimate a MNProb model which provides a smoother variance structure (Table 3). The results are fairly robust across specifications, thus confirming that, contrary to expectations, the IIA hypothesis is not a serious concern in the case of our data.

Moving on to the empirical results, in the multinomial specifications the probabilities of Residential Care and Informal Home Care are estimated against Paid Home Care, which has been taken as the reference case. We see that RC is predominantly determined by severity indicators, such as the number of ADLs and IADLs the individual is unable to perform autonomously, difficulty preparing meals and the presence of intense in-kind public support.

Households living in small towns and rural areas also display a higher propensity to institutionalise the dependent family members, whereas in large towns and cities PHC is

more frequently chosen. At first glance this may appear counterintuitive, since small towns tend to be characterised by more traditional lifestyles and stronger family ties, which in turn are usually associated with a greater propensity for informal care. However, the supply of assisted living facilities and personal care services in the Italian market may help explain this finding. Because of the high cost of rental accommodation in towns and cities, there is a larger per-capita supply of residential beds in less densely populated areas, usually within smaller municipalities. Consequently, urban areas are more likely to suffer a shortage of beds, requiring families to spend considerable time and money on visiting elderly family members on a regular basis, thus making residential care a relatively less attractive solution for those living in large towns and cities. However, personal caregivers tend to be concentrated in urban areas. Taken together, both factors contribute towards making PHC relatively more accessible for those living in densely populated areas.

Unlike RC, the IHC option is influenced by characteristics other than those related to severity. As regards DE characteristics, those who lived alone before becoming dependent, are much more likely to opt for PHC rather than for IHC. Recent evidence (Kalwij et al., 2013) suggests that for frail individuals living alone, informal home care provided by friends and neighbours often replaces the more limited support provided by family members. On the other hand, our data would suggest that this potential safety net does not appear strong enough to fully compensate for the reduced potential informal help from the family circle, as those living alone at the onset of disability are more likely to receive formal home care rather than informal home care. This probability is also positively associated with age, but not with the length of dependency or the number of ADLs the

individual cannot perform autonomously; this would suggest that PHC is mostly driven not by more severe disability, but by other organisational needs the family may have.

As regards family characteristics, the coefficient for household income is significant and negative, thus indicating that low-income groups may still find it difficult to access PHC, despite the fact that poor regulation of the Italian market reduces the cost of home care services. Two factors are expected to contribute to the result: for low-income groups, budget considerations negatively affect the allocation of funds to paid care, while at the same time these groups may also face a lower opportunity cost of time, compared to high-income families. House ownership has no significant impact on our estimates. The result seems to suggest that income flows affect LTC choices more than wealth stocks, due to the limited liquidity of real assets. However, since we lack information on house values and mortgages, it is also possible that house ownership represent a poor proxy of a household's accumulated wealth, particularly given the high proportion of home owners in Italy. Finally, a head of the household suffering from chronic disease is associated with a lower probability of informal care provision, whereas this probability increases with the proportion of elderly people in the household. Both results are consistent with those supply-side arguments based on the potential for informal care within the family.

A relevant role is also played by the attitudes of the head of the household. The *Residence choice* variable can be interpreted as a proxy for the strength of family ties. As expected, those who claim that the desire to live close to their relatives was the most important determinant in their residence choice, are more likely to keep their elderly at home and provide care through the family network. Household's opinions on the financing of LTC service also influence the decision: families who prefer universal public intervention for

LTC and support cash transfers if the primary caregiver is a paid person outside the family, are more likely to opt for paid home care. This results confirms the importance of controlling for cultural factors not only at the macro, but also at the micro, level.

We fail to find any influence of DE gender in the estimated models, indicating that households adopt similar responses to the frailty of their relatives irrespective of the gender of the persons involved, once socio-economic status and living conditions have been taken into account. This is at odds with results indicating that women are more frequent recipients of formal care than men. Moreover, household size is also not very significant, contrary to what has been suggested in recent studies (Bonsang, 2009; Paraponaris et al., 2012). The inclusion of a dummy for the presence of a housewife, a figure often claimed to play a crucial role in the decision to maintain elderly household's members at home, was not significant either, and the variable was not included in the final specification. We also tried different alternatives for family education, but none of them turned out to be significant.

5.2 Sequential choice models

Table 4 shows estimates for the bivariate probit with sample selection. Although not strictly necessary under a fully parametric approach (Wilde, 2000; Monfardini and Radice, 2008), the variable *Heavy help* is omitted from the second stage in order to reinforce identification. The variable captures substantial public support traditionally associated with those cases requiring skilled assistance, often with a medical component. Since personal care provided either by the family or by unskilled paid helpers, is a poor substitute for such specialised care, it is reasonable to assume that the variable does not influence the choice between IHC

and PHC, while it is expected to affect the choice between residential and home care, as the former is more appropriate for ensuring regular medical supervision.

The null hypothesis of $\rho=0$ is not rejected (table 4) and, consequently, separate estimations are unbiased and ensure efficiency gains, whereas a joint estimation would be required under non-null correlation. Table 5 presents two separate probit equations, where the decision between RC and HC is estimated for the entire sample, and the decision between IHC and PHC for those observations where home care was chosen in the first stage. Coefficients and significance levels are robust when shifting from joint to separate estimations.

The comparison between the first and second stage highlights the differing role of severity conditions. With the exception of age, all proxies for the magnitude of disability influence the choice between RC and HC, while they do not affect the one between IHC and PHC. The more severe the dependency, the more likely it is the institutionalisation of the frail person. The result holds for all the proxies (length of disability and number of ADLs and IADLs the person is unable to perform), and confirms that the probability of institutionalisation is positively affected by deterioration in health and functional ability (Stern, 1995).

Individuals living alone are more likely to be institutionalised, and to purchase assistance in the market in the case of HC. This is in line with previous findings according to which older adults living alone are more likely to use formal services and to be admitted to residential care facilities (Heiss et al., 2003), and this may be explained by the reluctance of the elderly and of their adult children to cohabit in response to the onset of disability (past habits, distance, problems to accommodate a new person in the house): paying a caregiver

helps towards keeping an elderly person at home even when that person's self-sufficiency diminishes.

People currently receiving substantial public support (*Heavy help*) are more likely to be institutionalised, confirming that the variable is a good proxy for the need for skilled care. As previously discussed, the variable has been omitted from the second stage equation for identification purposes. It is not expected to affect the choice between different types of home care, since it identifies subjects in need of highly specialised assistance for which neither the family, nor paid helpers, usually possess the necessary professional skills.

Furthermore, in the sequential choice process household size does not affect results, whereas house ownership has a (limited) impact, restricted to the decision to hire a caregiver. The coefficient for income is statistically significant and displays the expected sign, with high-income groups more likely to opt for the more costly alternatives at each stage, i.e. residential and paid home care, respectively. Interestingly, the income variable has a larger impact on the choice of hiring a caregiver, than on the institutionalisation of the dependent person, a decision which, as we have seen, depends largely on severity as well. The presence of income barriers to accessing formal LTC services inevitably raises equity concerns, which are exacerbated if one considers that not only the choice of the caring arrangement, but also the magnitude of limitations in daily activities, may be influenced by socio-economic status as well as demographic and health conditions, which in turn may give rise to undesirable forms of social exclusion (Pascual and Cantarero 2007; Davin, Paraponaris and Verger, 2009).

Households for whom the desire to live close to their relatives was the most important determinant in their choice of residence, are more likely to keep their elderly at home, and

if so, also to provide care directly rather than acquiring such services in the market. Interestingly, the coefficients of the remaining set of controls are robust to the inclusion of variables reflecting households' views, which also improves the significance of several estimated coefficients. This suggests that controlling for such factors actually enhances the accuracy of the estimates by capturing part of individual unobserved heterogeneity.

6. CONCLUSIONS

In Italy, elderly care is increasingly delegated to privately paid caregivers, a trend which together with other ongoing socio-demographic changes, requires a better understanding of elderly care arrangements in order to respond effectively to the changing demand for LTC. The paper provides empirical insights into the determinants of households' choices between residential care, and informal and formal home care for older adults suffering limitations to their ability to perform daily activities. Our results indicate that severity conditions plays a major role in the decision to institutionalise the dependent elderly than family characteristics do. Socio-economic status positively influences the probability of institutionalisation, but it plays a limited role compared to the one played in the choice between informal and formal home care, where it is strongly, positively associated to the latter.

Residential care appears to attract the most severe cases, with a reasonably good matching between intensity of need and supply of skilled services. These results can be interpreted in the light of social norms concerning filial responsibility, which continue to attach social stigma to institutionalisation, often seen as an option of last resort. To the extent that functional limitations still permit the elderly to be looked after at home, two different

responses emerge: high income groups more frequently hire an external caregiver, while low income families tend to opt for informal care. Given the high burden and opportunity costs of informal care, and the prospective reduction in the potential of care provision within the family, policy measures should be designed to facilitate access to the market of personal services also on the part of middle- and low-income groups.

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APPENDIX

Figure 1. ***The simultaneous decision process***

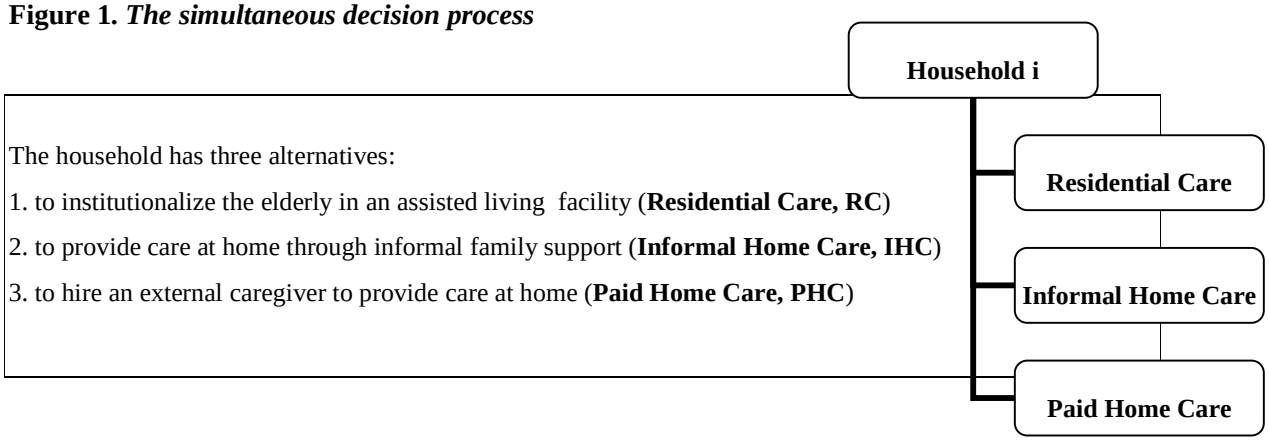


Figure 2. ***The sequential decision process***

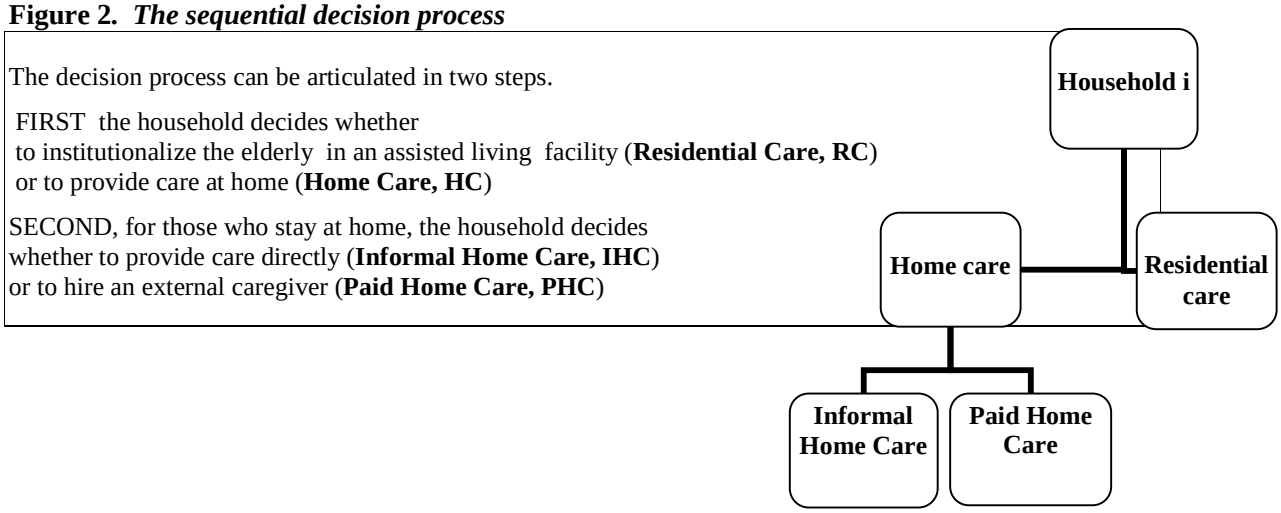


Table 1. Definitions of variables and descriptive statistics

Variable	Definition	Mean	Std. Dev.
DE characteristics			
Age DE	Age of DE in years	77.38806	16.46931
Female DE	= 1 if DE is a female	.69527	.46098
LTC spell	Spell of disability in years	8.88589	12.79990
Single living	= 1 if DE lived alone before disability	.24551	.43103
Heavy help	Public support for > 40 days	.026334	.16018
Num ADL	Number of ADLs and IADLs in which DE is not self-sufficient	2.36196	2.46782
Cooking meals	= 1 if the DE is unable to prepare meals	.707831	.45544
Family characteristics			
Age Head of the household	Age of the head of the household	48.84402	12.80121
Chronic Head of the household	= 1 if the head of the household suffers of chronic conditions	.20072	.40067
Elderly ratio	Members >65/total number of household members	.12473	.28147
Household size	Number of family members of PR	2.81423	1.20968
Economic characteristics			
Household income	Household income in Euro (PR+ PR spouse, if present)	1930.752	878.6728
House ownership	= 1 if PR and his family have the house ownership	.79217	.40589
Spatial variables			
Towns > 25,000	= 1 if PR lives in a town with more than 25.000 inhabitants	.11317	.31691
Towns < 5,000	= 1 if PR lives in a town with less than 5.000 inhabitants.	.061922	.24110
Family opinions			
Universal access	Public sector should provide universal coverage for LTC	.24769	.43182
Need-based access	Public sector should provide fundamental LTC	.30890	.46220
Residence choice	= 1 if PR's residence choice was influenced by the will to live close to other relatives (family ties)	.19217	.39415
Cash Care 1	=1 if PR supports cash transfer to the family without justification of how the benefit is spent	.28470	.45143
Cash Care 2	=1 if PR supports cash transfer to the family only for external paid helper	.128826	.33512

PR = person responding to the survey

DE = disabled elderly

Table 2. *The simultaneous decision process*: multinomial logit specification

	Coeff.	Std. Err.	Coeff.	Std. Err.
RESIDENTIAL CARE	MODEL A		MODEL B	
Age DE	-.0010	.0280	-.0072	.0183
Female DE	-.2639	.5738	-.3683	.5856
LTC spell	.0305	.0220	.0330	.0230
Single living	.3288	.5206	.5500	.6034
Heavy help	1.6879	.7059**	1.6759	.7633**
Num ADL	.2296	.1032**	.2370	.1063**
Cooking meals	1.09699	.7958	1.5790	.8193**
Age Head of the household	-.0223	.0236	-.0371	.0254
Chronic Head of the household	-.3214	.5243	-.0572	.5884
Elderly ratio	.8137	1.4458	.6455	1.6690
Household size	.0457	.2074	.0538	.2353
Household income	.0000	.0002	.0001	.0003
House ownership	-.7890	.6685	-.5948	.6827
Town>25000	-2.6944	1.1853**	-2.7227	1.129**
Town<5000	1.6109	1.2465	2.0431	1.015**
Universal access			-.4341	.6058
Need-based access			-.6465	.5281
Residence choice			-.5827	.5740
Cash care 1			.0676	.5559
Cash care 2			-.5587	.6214
Constant	-.4885	2.7972	-.9096	3.0024
INFORMAL HOME CARE				
Age DE	-.0472	.0230**	-.0539	.0215**
Female DE	-.4975	.4414	-.5583	.4698
LTC spell	-.0147	.0176	-.0128	.0187
Single living	-.6982	.4269	-1.0403	.4967**
Heavy help	-.0207	.0864	.0835	.7674
Num ADL	.0207	.0864	-.0218	.0886
Cooking meals	-.6550	.4620	-.8122	.4744*
Age Head of the household	-.0244	.0187	-.0209	.0207
Chronic Head of the household	-1.0276	.4213**	-.7949	.4870*
Elderly ratio	2.2307	1.0437**	1.9731	1.0727*
Household size	.1689	.1738	.2946	.1991
Household income	-.0006	.0002***	-.0007	.0002***
House ownership	-.2111	.5248	.0557	.5441
Town>25,000	-.4087	.5572	-.1025	.6704
Town<5,000	1.2942	1.2587	1.5354	.8570*
Universal access			-1.1639	.4662**
Need-based access			.6843	.4365
Residence choice			1.1404	.5060**
Cash care 1			.4290	.4587
Cash care 2			-1.6090	.6178***
Constant	8.2377	2.0242***	8.4399	2.1274***
Pseudo r^2		.2169		.2832
Log pseudo likelihood		-184.6198		-168.9978
Sample size		251		251

Hausman Test

Omitted	Chi2	df.	P>chi2	Evidence
0	-1.867	20	1.000	for Ho
1	-253.565	20	0.000	for Ho
2	-9.369	20	1.000	for Ho

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

Table 3. *The simultaneous decision process*: multinomial probit specification

	Coef.	Std. Err.	Coef.	Std. Err.
RESIDENTIAL CARE	MODEL A		MODEL B	
Age DE	-.0014	.0197	.0001	.0202
Female DE	-.2752	.3849	-.2936	.3939
LTC spell	.0208	.0145	.0229	.0154
Single living	.327	.3609	.4825	.4026
Heavy help	1.0991	.4870**	1.0646	.5102**
Num ADL	.1584	.0729**	.1622	.0737**
Cooking meals	.7635	.4680	1.0869	.5019**
Age Head of the household	-.0183	.0160	-.0267	.0166
Chronic Head of the household	-.2916	.3699	-.1915	.3962
Elderly ratio	.6680	.9592	.7429	1.0157
Household size	.0476	.2074	.0538	.1585
Household income	.0000	.0002	.0000	.0002
House ownership	-.4874	.4566	-.4057	.4689
Town>25000	-1.9184	.6952***	-1.9043	.6985***
Town<5000	1.0473	.7671	1.4696	.7050**
Universal access			.1724	.4087
Need-based access			-.4375	.3622
Residence choice			-.4210	.4156
Cash care 1			.0864	.3777
Cash care 2			-.3257	.4499
Constant	.0382	1.9178	-.0884	2.0265
INFORMAL HOME CARE				
Age DE	-.0385	.0167**	-.0449	.0164***
Female DE	-.3802	.3167	-.3675	.3363
LTC spell	-.0128	.0125	-.0102	.0132
Single living	-.5499	.3225*	-.7915	.3465**
Heavy help	-.6787	.4939	-.1431	.4884
Num ADL	.0044	.0648	-.0155	.0652
Cooking meals	-.4680	.3409	-.6021	.3545*
AGE Head of the household	-.0192	.0137	-.0148	.0147
Chronic Head of the household	-.7699	.3195**	-.6350	.3480*
Elderly ratio	1.6064	.7175**	1.4313	.7127**
Household size	.1469	.1275	.2523	.1424*
Household income	-.0005	.0001***	-.0006	.0002***
House ownership	-.1078	.3705	.0586	.3784
Town>25,000	-.2769	.4389	-.0665	.4836
Town<5,000	.8975	.7683	1.2429	.6189**
Universal access			-.9055	.3302***
Need-based access			.5725	.3127*
Residence choice			.9400	.3691**
Cash care 1			.3951	.3315
Cash care 2			-1.1399	.4435***
Constant	6.5747	1.4958***	6.5933	1.5457***
Log pseudo likelihood		-185.0604		-169.8171
Sample size		251		251

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

Table 4. *The sequential decision process*: probit model with sample selection

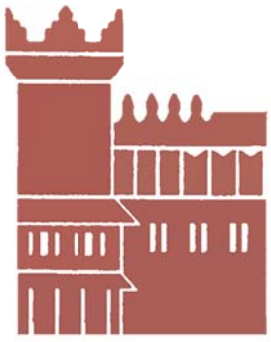
	Coef.	Std. Err.	Coef.	Std. Err.
HOME CARE	MODEL A		MODEL B	
Age DE	-.0160	.0134	-.0236	.0127*
Female DE	.0255	.2590	.2165	.2656
LTC spell	-.0217	.0086**	-.0248	.0084***
Single living	-.4925	.2466**	-.7946	.2951***
Heavy help	-1.2758	.2755***	-1.0504	.2319***
Num ADL	-.1217	.0526**	-.1296	.0512**
Cooking meals	-.7492	.3185**	-1.1274	.3967***
Age Head of the household	.0032	.0106	.0130	.0089
Chronic Head of the household	-.0500	.2643	.0634	.2797
Elderly ratio	.2625	.5635	.0398	.6019
Household size	.0391	.0882	.1201	.0980
Household income	-.0002	.0001*	-.0003	.0001**
House ownership	.3338	.2853	.3317	.2836
Town>25000	1.5440	.6057**	1.7060	.5975***
Town<5000	-.2055	.4371	-.3677	.4494
Universal access			-.6607	.2898**
Need-based access			.6628	.2600**
Residence choice			.8983	.2849***
Cash care 1			.2354	.2352
Cash care 2			-.0267	.3319
Constant	3.494	1.308***	3.6498	1.3513***
PAID HOME CARE				
Age DE	.0248	.0129**	.0313	.0117***
Female DE	.3205	.2391	.2065	.2420
LTC spell	.0057	.0096	.0033	.0091
Single living	.3108	.2436	.4524	.2732*
Num ADL	-.0437	.0562	-.0461	.0468
Cooking meals	-.2229	.2492	.2580	.2505
Age Head of the household	.0136	.0099	.0129	.0080
Chronic Head of the household	.5666	.2520**	.4729	.2441*
Elderly ratio	-.9642	.5775*	-1.1801	.5088**
Household size	-.0990	.0930	-.1525	.0910*
Household income	.0004	.0001***	.0004	.0001***
House ownership	.0348	.2808*	-.0545	.2946
Town>25,000	.3604	.3123	.1937	.3449
Town<5,000	-5978	.5493	-7896	.4398*
Universal access			.6699	.2784**
Need-based access			-.3335	.2349
Residence choice			-.3914	.2447*
Cash care 1			-.1962	.0242
Cash care 2			.4745	.2834*
Constant	-4.5536	1.2684***	-4.7258	1.0866***
rho	.7312	.4745	1	9.53^{e}-1
Wald test for rho=0:	chi2(1)=0.83		chi2(1)=0.01	
	Prob > chi2 = 0.3610		Prob > chi2 = 0.9059	
Log pseudo likelihood	-183.7212		-166.5682	
Sample size 251				

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

Table 5. *The sequential decision process*: probit model (separate estimation)

	Coef.	Std. Err.	Coef.	Std. Err.
HOME CARE	MODEL A		MODEL B	
Age DE	-.0266	.0098***	-.0299	.0112***
Female DE	.0373	.2495	.0877	.2552
LTC spell	-.0224	.0089**	-.0239	.0090***
Single living	-.4649	.2460*	-.793	.2705***
Heavy help	-1.1887	.2744***	-.9689	.2919***
Num ADL	-.1227	.0491**	-.1414	.0508***
Cooking meals	-.7892	.3127**	-1.055	.3641***
Age head of the householdr	.0037	.0106	.0138	.0107
Chronic Head of the household	-.1213	.2472	-.1441	.2693
Elderly ratio	.3587	.5656	.1992	.6267
Household size	.0302	.0873	.0765	.0958
Household income	-.0002	.0001	-.0003	.0001**
House ownership	.2867	.2869	.2799	.2921
Town>25,000	1.4036	.5095***	1.5823	.5295***
Town<5,000	-.3064	.4276	-.40593	.4412
Universal access			-.6433	.299**
Need-based access			.6199	.2350***
Residence choice			.8488	.2675***
Cash care 1			.0813	.2262
Cash care 2			-.1840	.3283
Constant	4.3518	1.1018***	4.3292	1.2537***
Wald chi2	62.23	Prob>chi2=0.0000	61.93	Prob>chi2=0.0000
Log pseudo likelihood		-93.3839		-86.3806
Sample size		276		276
PAID HOME CARE				
Age DE	.0327	.0095***	.0366	.0104***
Female DE	.3546	.2437	.3025	.2557
LTC spell	.0133	.0094	.0090	.0097
Single living	.4271	.2505*	.6216	.2882**
Num ADL	-.0190	.0524	-.0018	.0524
Cooking meals	-.3454	.2520	.4212	.2622
Age Head of the household	.0143	.0102	.0104	.0109
Chronic Head of the household	.6139	.2425*	.5559	.2652**
Elderly ratio	-1.0925	.580*	-1.1724	.5381**
Household size	-.1331	.0970	-.1810	.1079*
Household income	.0005	.0001***	.0005	.0001***
House ownership	.0348	.2808*	-.1423	.3054
Town>25,000	.1937	.3189	-.0085	.3773
Town<5,000	-5990	.5803	-.9062	.4562**
Universal access			.7746	.2884**
Need-based access			-.4545	.2543*
Residence choice			-.6556	.2725**
Cash care 1			-.2764	.2594
Cash care 2			.7561	.3166**
Constant	-5.2970	1.0253***	-5.1756	1.1266***
Wald chi2	50.95	Prob>chi2=0.0000	64.32	Prob>chi2=0.0000
Log pseudo likelihood		-95.5723		-85.5220
Sample size		228		228

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



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