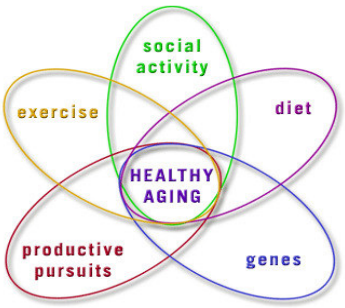

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Working Paper n. 3-2015

UNIVERSITÀ CATTOLICA
del Sacro Cuore

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Home Sweet Home? Public Financing and Inequalities in the use of Home Care Services in Europe[1]

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This version, December 2015.

Abstract

Income-related inequalities in health care access have been found in several European countries but little is known about the extent of inequalities in the provision of Long Term Care services (LTC). This paper fills this gap: it addresses equity issues related to the provision of home care services across three macro-areas in Europe which are highly heterogeneous in terms of the degree of public financing of LTC and the strength and the social value of family ties. Using cross-country comparative micro-data from SHARE (Survey of Health, Ageing and Retirement in Europe) survey, we estimate and decompose an Erreygers concentration index of the use of both paid domestic help ("unskilled" care) and personal nursing care ("skilled" care), measuring the contribution of income, needs and non-needs factors to overall inequality. We base the decomposition on a bivariate probit model which takes into account the reciprocal interaction between formal and informal home care use. We find evidence of high horizontal inequity in the use of unskilled home care in areas where public financing of LTC is relatively low (Southern Europe) while moderate inequalities emerges in areas where public-private mix of financing is more balanced (Continental Europe). At the same time, we do not detect inequity in Northern Europe characterized by high public spending on universal services equitable for all, including LTC public coverage. In all areas, informal care has been found to be a substitute for paid unskilled care among the poor and this contributes to further skewing the distribution of the use of formal care services towards the rich.

Keywords: inequality, LTC insurance, home care

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[1] An earlier draft of this paper was presented at the annual meeting of the Italian Health Economics Association, Venice, Italy, at the Rand Corporation Workshop on Aging, Santa Monica (USA), at the workshop on Public Financing of Long-term Care London School of Economics. The authors wish to thank the conference and workshops participants for their detailed and helpful comments. The authors in particular wish to thank Joan Costa Font, Mario Ferrero and Francesca Zantomio for useful suggestions. We gratefully acknowledge financial support from Fondazione Farmafactoring (Milan) through the Young Researcher Award Program. The usual disclaimer applies.

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1. Introduction

An extensive literature documents the existence of income-related inequalities in the access to health care in Europe for a wide set of medical and preventive health care services (e.g. Carrieri and Wuebker, 2013, Jusot and Sirven, 2011; Lorant et al., 2002; van Doorslaer et al. 2000, 2006). These inequalities persist also after controlling for the different distribution of needs across income groups, thus raising important ethical concerns. Indeed, the presence of needs-adjusted income-related inequalities in the use of health services represents the violation of the well-known horizontal equity principle according to which people in equal need ought to be treated equally irrespective of their income position. For this reason, several countries have undertaken systematic policy actions to measure, monitor and tackle these inequities (see, for instance, the English Action Report, Department of Health, 2009).

Despite the increasing attention towards inequity in health care access, until today, little is known about the extent and the determinants of horizontal inequity in the access to long-term care (hereafter LTC) services, namely health, social and residential services provided to chronically disabled persons over an extended period of time. This lack of evidence is troublesome for at least three reasons. Firstly, these services are more often used by the elderly people who represent a significant and growing percentage of the European population: forecasts for European demographics show that around half the population of the EU-27 countries will be over fifty in the year 2060, while over-65-year-olds will increase from the current value of 17.4% to 30% (Eurostat, 2010). This means that the next decades will see increasing rates of care-dependent older people in need of LTC. Secondly, demographic and cultural trends in European countries are changing the traditional patterns of care. Although the family still acts as a strong support network for the elderly, the demographic transition, the de-familiarization process and the dramatic increase in female labor force participation have reduced the possibilities of providing care informally. The increasing demand for care, in combination with a reduced potential for informal care, is likely to result in a need to expand formal care services (Crespo and Mira, 2010; Di Novi et al., 2015; Brenna and Di Novi, 2015). Thirdly, public financial resources available to pay for LTC assistance are continuously decreasing (Costa-Font, 2010) and this may increase income-related inequalities in the access to LTC services, especially in Countries where the extension of LTC public insurance is relatively low.

In this paper we measure and explain inequalities in the provision of formal LTC services among European elderly (over 65 years old) using cross-country comparative micro-data from SHARE (Survey of Health, Ageing and Retirement in Europe) survey. Specifically, we focus on the inequality in the access to home care services which cover a wide range of needs: from homemaking and companionship to meal preparation and medication reminder to personal care services and help with the activities of daily living such as bathing and dressing. We investigate inequities across three macro-areas in Europe using a stratification

which reflects differences in the degree of public financing of LTC services and in the degree of responsibility for the provision of informal care which is generally attributed to the individual by local social norms (see section 2.1 for more details).

Our analysis proceeds in two steps. Firstly, we explore the level of horizontal inequities in the access to home care services, testing whether elderly individuals, with the same level of need, experience a difference in the level of utilization related to their income. We measure income inequalities in home care use by means of the corrected version of the concentration index for binary dependent variables (Erreygers, 2009). Following Bonsang (2009), we consider separately two types of formal home care: skilled (nursing care) and low-skilled (paid domestic help) formal home care.

Secondly, we decompose the Erreygers index into the contributions of income, need and non-need factors following the method adopted by Van Doorslaer Koolman and Jones (2004) in the analysis of income-related inequalities in medical care. This decomposition technique allows us to explain the determinants of the inequity observed in the three European macro-areas. An important element of novelty of our empirical strategy is that we base the Erreygers index decomposition also on a bivariate probit model with exclusion restrictions which takes into account the reciprocal interaction between formal and informal home care, thus controlling for the potential simultaneity between formal care and informal care (see also Van Houtven and Norton, 2004; Bolin et al., 2008; Bonsang, 2009; Balia and Brau, 2013).

Our results, robust under different specification of the model, reveal a clear North–South gradient. We find horizontal inequity favouring the rich in the in the use of paid domestic help in Southern countries, and a substantial horizontal equity in the use of these services in Northern Countries .

The remainder of the paper is organized as follows: Section 2 describes the data. Section 3 illustrates the empirical model, while the results are presented and discussed in Section 4. Concluding remarks are reported in Section 5. The description of the bivariate probit model, the sensitivity analysis, the definition of the variables, descriptive statistics and tables with estimation coefficients are in Appendix.

2. Data

The individual-level data employed in this study are drawn from the second wave of SHARE (Survey of Health, Ageing and Retirement in Europe). SHARE, coordinated by the Mannheim Research Institute for the Economics of Aging (MEA), collects detailed information on a wide variety of aspects, among which the health status, health care access and socio-economic characteristics of people aged 50+ in Europe. The design is based on the Health and Retirement Study (HRS) and the English Longitudinal Study of Ageing (Borsh-Supan and Jurges, 2005).

The survey information for the second wave of SHARE was collected between the end of 2006 and the summer of 2007 respectively, through Computer-Assisted Personal Interviews (CAPI) supplemented by a

self-completion paper. Our analysis is based on version 2.5.0 of SHARE's second wave.[2] Data are used from the following 10 European countries: Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain and Sweden. After careful consideration, we decided to exclude three countries that were incorporated in this wave of SHARE, namely Switzerland, the Czech Republic and Poland. Switzerland and the Czech Republic were not included since the indicator of home care contains too many missing values. Poland was excluded since information concerning informal care and formal care received at home was not available.

Three selection criteria were imposed on the sample: 1) respondents should be 65 years of age or above, 2) not living with children and 3) not permanently live in a nursing home. After correcting for the missing values, the final sample includes 9239 observations.[3]

2.1 The Provision of LTC in Europe: Differences between Macro-Areas

Previous studies have demonstrated that the use of formal and informal care services is generally dependent on two main factors: i) societal attributes, such as the availability of public LTC insurance coverage and ii) the strength and the social value of family ties (see also Brenna and Di Novi, 2015; Di Novi et al; 2015; Crespo and Mira, 2014; Bolin et al, 2008). Both factors are highly heterogeneous across European macro- areas and this may result in important differences in the use of such as services.

The social value of family ties and the design of the long-term care systems highlight where the primary responsibility for meeting care needs lies. It may lie with the individual (Scandinavian model), the nuclear family (Continental model) or the extended family (Mediterranean model). Consistently with these differences in the share of public coverage and in the social values of family ties, we stratify our sample into three models that we label as Northern, Continental and Southern Europe. Northern Europe model includes Denmark, Sweden and the Netherlands and is characterized by high public financing of LTC and an individual responsibility in the provision of LTC. Continental Europe model includes Austria, Belgium, France and Germany which are characterized by a "moderate" public financing of LTC and a nuclear family responsibility in the provision of LTC services. Finally, Southern Europe model includes Italy, Spain and Greece which are characterized by a low public financing of LTC and a high responsibility of the extended family in the provision of LTC services.

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[2]We did not use the first wave of SHARE since income is measured before taxes and transfers while in all other waves it is measured after taxes and transfers. The two income measures are not directly comparable and, if used jointly, might produce biased estimates of income-related inequalities in LTC. This issue might be particularly severe for our empirical analysis based on cross country data and carried out in European countries which are characterized by different tax and transfer systems. Also, the fourth wave of SHARE has not been employed in our analysis because does not include any information on the recourse to LTC services.

[3] According to Bonsang (2009), we exclude respondents living with their children since SHARE does not provide information about the way, the type, and the importance of the transfers that take place within a household.

The OECD Health Data (2011) which show the LTC public expenditure as a share of national GDP support our classification. Figure 1(see Appendix III) shows that the public system of long-term care is most generous in Sweden, Denmark and the Netherlands: they spend respectively 3.7%, 3.6% and 2.4% of their GDP on LTC. These Countries offer universalistic public coverage for LTC services and the state responsibility for providing care services for older people is greater than in the other European countries. At the opposite side Southern European countries have a thinner formal long term care system and formal home care network: the role of the state is minimal and LTC financing is highly privatized; here the expectation is that social care will be mainly provided within the family (see also Costa-Font and Zigante, 2014). Figure 1 shows that Spain and Greece spend 0.7% and a bit less of 0.1% of their GDP on LTC, respectively.[4] In between these two extremes, a third cluster, the Continental countries (Austria, France, Germany, Belgium) which are characterized by moderate levels of formal and informal care provision. Continental countries show a "moderate" level of public expenditure on LTC as a percentage of GDP which ranges from 1% in Germany to 2% in Belgium.

The countries classification proposed here presents some parallels with Esping-Andersen's (1990) traditional classification of welfare states: similar to Esping-Andersen's (1990) approach we consider as first cluster the Scandinavian/Northern group of countries that is close to Esping-Andersen's "social-democratic" regime cluster with high levels of state support (indeed LTC insurance is mainly delegated to the public sector) and in which welfare coverage is universal and attempts to treat all citizens equally. In Esping-Andersen, France, Germany, Austria and Belgium are grouped together into the "conservative" regime cluster characterized by the preservation of the status quo and its inequalities. Social rights tend to be attached to class and what one has earned by one's work effort. Esping-Andersen's traditional classification includes also Italy in the conservative group, while we assigned Italy to another cluster: the Southern Europe cluster. It seems appropriate to classify the South European countries as a separate cluster when attention is shifted to the care sector: Southern European countries such as Greece, Italy and Spain form a distinctive cluster due to the strong role of the extended family and lower welfare services (Mingione, 2001).

3. Empirical Model

3.1 The Erreygers Concentration Index

Our empirical analysis involves two basic steps. Firstly, we measure income related inequality in home care use employing Erreygers' Concentration Index and then we decompose Erreygers' Concentration Index into the contribution of income, need and non-need factors to explain inequality across countries.

[4] Data for Italy expenditure were missing since they are not included in the OECD data we used (see Figure 1).

Socio-economic inequalities in home care use are calculated by means of a Concentration Index (CI) (Wagstaff et al., 1991; Wagstaff and Van Doorslaer 2000). The following concentration index measures socioeconomic inequality in access to home care services:

$$CI = \frac{2}{n\mu}\sum_{i=1}^{n} y_i R_i - 1 = \frac{2}{\mu} * \mathrm{cov}(y_i, R_i) \qquad (1)$$

where μ is the average access to home care service in the sample, *n* for the sample size, *y* is an indicator of access to home care services by individual *i* and R_i designates the *ith* individual´s rank within the income distribution. The equation (1) shows that the value of the CI equals the covariance between the indicator of home care access (y_i) and the individual's living standard rank (R_i), divided by the average of the access (μ). Then, the whole expression is multiplied by 2 to ensure that the CI ranges between -1 and +1.

Since home care is a bounded variable (i.e. home care utilization yes or no), we use the corrected version of the concentration index as suggested by Erreygers (2009). We need to use a generalized concentration index – defined as concentration index as in (1) multiplied by the mean of home care use – to satisfy the mirror condition, namely the invariance of country ranking to the coding of home care services utilization as 0 or 1. The Erreygers index satisfies this property. It is an absolute inequality index as it weights inequality constantly and independent of the average use in a country (see also Kjellsson and Gerdtham, 2013). This index is particularly appropriate for situations in which average use of home care services strongly differs among countries as in our case.

The formula for the corrected concentration index is:

$$E(y) = \frac{4\mu}{(b_n - a_n)} C(y) \qquad (2)$$

Where b_n and a_n represent the maximum and minimum of the home care access variable (*y*) (in our case 0 and 1), μ is the mean of the home care access variable in the population, and *C (y)* represents the Concentration Index specified in (1).

As a second step, we decompose socio-economic inequality as follows:

$$EI(y) = 4 * \left[(\beta_r \bar{x}_r CI(x)_r + \sum_{nn} \beta_{nn} \bar{x}_{nn} CI(x)_{nn} + \sum_{n} \beta_n \bar{x}_n CI(x)_n + \sum_{ic} \beta_{ic} \bar{x}_{ic} CI(x)_{ic} + GCI(\varepsilon_i) \right] \qquad (3)$$

Where $\bar{x}_r$, $\bar{x}_{nn}$, $\bar{x}_n$, and $\bar{x}_{ic}$ represent respectively the means of income (x_r), non-need variables (x_{nn}), need variables (x_n) and informal care (x_{ic}). $CI(x)_r, CI(x)_p, CI(x)_n$ and $CI(x)_{ic}$ their concentration indices, $GCI(\varepsilon_i)$ is a residual term.

Equation (3) shows that socio-economic inequalities in home care use can be represented as a weighted sum of the inequalities in its determinants. The weights are represented by the regression coefficients evaluated at the means (i.e. semi-elasticities). The decomposition provides the possibility of identifying the driving factors of inequalities in the use of home care services among the elderly: the higher the inequality (CI) or the semi-elasticity, the higher the contribution (Bonfrer et al., 2012).

Decomposition of the concentration index as in equation (3) is based on linear modeling of home care use. However, since the outcome variable in this study is binary, the decomposition is possible only through a linear approximation based on partial effects (the betas in equation 3) estimated by a non-linear model (Van Doorslaer et. Al, 2004).

In this application, the situation is further complicated by the inclusion of informal care among the dependent variables in the formal care access equation. Indeed, informal care and formal home care may be simultaneously determined (Van Houtven and Norton, 2004.) This may be due to the fact that the receipt of informal care may be correlated to unobserved health characteristics or to unobserved preferences for care that are likely to influence the demand for home care (Charles and Sevak, 2005; Bonsang, 2013). For these reasons, we computed the partial effects in equation (3) through a recursive bivariate probit model. The recursive structure of the bivariate probit model builds on a first structural form equation determining the receipt of formal home care and a second reduced form equation for the potentially endogenous dummy measuring the receipt of informal care; it also relies on exclusion restrictions (details on this model are provided in the Appendix I). When exogeneity cannot be rejected, i.e. the estimated correlation coefficient between equations in the bivariate probit model is not significantly different from zero, we base the decomposition on a standard probit. In the standard probit we employ robust standard errors by applying a Huber-White sandwich estimator that corrects for heteroskedasticity of unknown form.

To draw inference on the concentration indices and on the contributions of each explanatory variable, we use a non-parametric bootstrap method with 1000 replications. The bootstrap method is adapted to reflect the stratified sampling with respect to the primary sampling unit of the SHARE survey. All computations are repeated on each resampled data set and the variability is used to obtain standard errors.

3.2 The Inequality Decomposition

In order to investigate equity issues related to the provision of home care services the model is estimated by considering separately skilled (nursing care) and low-skilled (paid domestic help) formal home care (see Bonsang, 2009). In the probit/bivariate probit models the dependent variables employed to predict the probability of receiving formal home care services are binary variables (see Table 1 for variable definitions).

The independent variables employed to predict the demand for home care services were categorized into three dimensions: 1) income; 2) need factors related to aspects of individuals' health status; 3) non-need factors.

Income information is based on total annual household income, obtained by adding up its different components assessed in the questionnaire after deductions for income tax and social or national insurance contributions. It mainly comprises labor income, public pensions and income from assets. To get the annual "equivalent household income" we adjusted for household size and composition. The equivalence scale formula is:

$$Equivalent\ income\ =\ family\ income\ /\left(No.\ of\ adults\ +\ \left(0.5\ *\ No.\ of\ children\right)\right)^{0.5}.$$

Need variables include age and several measures of health status. Following Bolin et al. (2008) we included, as measures for the need for formal care, indicators of self-perceived health, number of activity limitations, number of health conditions and number of symptoms. Concerning self-perceived health the following standard self-assessed health (SAH) status question was asked: "Would you say that in general your health is: excellent, very good, good, fair, poor". SAH was therefore measured on a five-point scale from 'excellent' (score 5) to "poor" (score 1) and treated as an ordered categorical variable. The use of SAH as an indicator of health status is supported by evidence which shows a strong predictive relationship between people's self-rating of health and morbidity (Idler and Benyamini, 1997; Kennedy et al., 1998). Moreover, SAH correlates strongly with more complex health indices such as functional ability or indicators derived from health service use (Undén and Elofsson, 2006).

We also included a continuous variable that captures the number of problems with functioning and disability: this indicator concerns the self-reported difficulty performing tasks related to mobility, strength and endurance (Nagi, 1976). The ten indicators of functioning ability include: walking one block, climbing several flights of stairs, climbing one flight of stairs, sitting for about 2 hours, getting up from a chair, lifting or carrying weights over 10 lbs, stooping, kneeling or crouching, picking up a dime from a table, reaching or extending arms and pulling or pushing large objects.

Then, we considered among the proxies of the need for care the number of health conditions (heart problems, high blood pressure, high cholesterol, stroke, diabetes, lung disease, asthma, arthritis, osteoporosis, cancer, ulcer, Parkinson disease, cataracts, hip or femoral fracture, psychological problems, other). In addition to chronic diseases, we controlled for health symptoms: a continuous variable that is the sum of different symptoms that the individual suffered from during the last 6 months (e.g., sleeping problems, falling down, persistent cough, fatigue, swollen leg, and dizziness). The average is 2.03 symptoms ranging between 0 to11. These symptoms were used as a proxy for the remaining overall health situation of the respondent.

Non-need variables included education, marital status and residential area. Education was measured by ISCED-97 classification. Three levels of education were considered: 1) low education (no educational

certificates or primary school certificate or lower secondary education); 2) medium education (upper secondary education or high school graduation); 3) high education (university degree or postgraduate). Marital status was categorized into "living with a spouse or a partner in the same household" and "living as single." We included also a rural/urban variable to proxy the potential lack of access to formal care services and social services for individuals living in rural areas. The following question was asked: "how would you describe the area where you live? A big city; the suburbs or outskirts of a big city; a large town; a small town; a rural area or village?" We dichotomized the variable into urban and rural, the latter including only people living in a rural area or village.

Finally, among the independent variables, we considered informal care received from children. For informal care we mean personal care (e.g. dressing, bathing or showering, eating, getting in or out of bed, and using the toilet), practical household help (e.g. home repairs, gardening, transportation, shopping, and household chores), and help with paperwork (e.g. filling out forms, and settling financial or legal matters). We built a binary variable that takes value one if respondent answered that he/she received informal care on at least weekly basis during the year of the interview.

4. Results

Table 1 presents summary statistics of the main variables used in the model for the whole sample, as well as for the three models, Northern, Continental, and Southern Europe, separately. Considering the whole sample the mean age of respondents is 74 years, and 53% of the sample is represented by women. Around 8% of the interviewed receives personal nursing care in the baseline year, while 3% of the respondents receives paid domestic help. We observe some differences in the use of home care services between the three areas. We find that 12% of respondents receive paid domestic help in the Northern countries, 11% in Continental countries and less than 5% in the South of Europe. Concerning the use of nursing care, we find that less than 6% of respondents receive this kind of care in Northern countries, 12.5% in the Continental countries and 3.5% in the Southern countries.

We will discuss the results separately for each type of formal home care considered in the analysis: skilled (nursing care) and low-skilled (paid domestic help). Firstly, we show the EI index estimates and then the decomposition results for each macro-region. Tables with the results from the univariate and bivariate probit models employed for the decomposition are provided in detail in Appendix III. The bivariate model showed in many cases significant correlation coefficients between the error term of the structural equation for formal home care and the reduced form equation for informal care (see Appendix I). Hence, the decomposition results presented in the following were often based on the partial effect computed using the bivariate probit estimates. When the exogeneity condition was not rejected, the decomposition was based on

the probit model. Estimates of correlation coefficients between formal and informal care equation have been included in Tables 2.a and 2.b for domestic help and personal nursing care, respectively.

Domestic Help

Table 2.a presents the estimates of Erreygers indices, partial effects and inequality contributions by macro-region for domestic help. Statistically significant coefficients, indices and contributions are indicated in bold.

(Table 2.a)

The first two rows of Table 2.a report the overall Erreygers index (EI) and the Erreygers Index adjusted for need (ENA), respectively. A negative value (EI or ENA) denotes a concentration favoring the poor, while a positive value implies a concentration in favor of the high-income groups.

We found positive and significant pro-rich inequalities (measured by the EI – first row of the table) in the *Continental* (0.0714) and *Southern Europe* model (0.0485) while pro-rich inequalities arise also in the *Northern Europe* model but they are much lower and not statistically significant (0.0316). However, these results are not conclusive as regards the degree of horizontal inequities because index estimates did not take into account needs distribution. Therefore, in the second row we reported Erreygers indices adjusted for needs (ENA), and, in general, pro-rich inequalities are also reinforced. This means that needs are more concentrated among poor individuals. Indeed, after adjusting for needs distribution, pro-rich inequalities increase in Northern and Southern Europe and they are high and statistically significant especially in Continental (0.0714) and Southern Europe (0.0485). Interestingly, in the Continental region, the need-adjusted index (ENA) is smaller than the overall index (EI), due to the role of demographic factors (i.e., age).

Table 2.a also shows decomposition results of Erreygers index for the use of domestic help by macro-region. Inequality in the probability of using both kinds of care in each macro-region is decomposed into the contributions of household income, need, and non-need factors.

Decomposition results reveal an interesting pattern of inequalities in the use of domestic help and some similarities across the areas analyzed. Indeed, both the direct contribution of income and the contribution of health needs are negative in all macro areas. The direct contribution of income to overall inequalities is rather modest in all areas, while the contribution of needs ranges from around 0.9% in Northern area to 0.1% in Southern countries. The negative contribution of income is due to the fact that its partial effect on the use of domestic help is negative while the concentration index is positive and statistically significant. Concerning the demographic indicators, age and gender seem to have a small effect on the formation of inequality in Northern and Southern areas. Conversely, age is pro-rich concentrated and

positively contributes to the formation of income-inequality in the Continental area. For this reason the total contribution of needs to overall inequality is positive in this area only.

Results display also a disproportionate concentration of needs among poor individuals, which is not sufficiently compensated for by a higher use of domestic help. Indeed, health need variables are all positively associated with the use of domestic help and they are also highly concentrated among the poor. As a consequence, a redistribution of domestic help among people with higher health needs would reduce income-related inequalities. Among the set of health need variables, self-perceived health and mobility account for the main contribution to the overall index.

The decomposition exercise reveals that receiving informal care positively contributes to the overall EI although its contribution is significant in the Continental area only. The mechanism behind this result may be interesting. Indeed, as the negative sign of the partial effect suggests, informal care acts as substitute of formal care. At the same time, informal care is highly concentrated among the poor and this actually contributes to generating pro-rich inequalities in formal domestic help. A possible explanation may be the fact that individuals belonging to lower income groups may have financial difficulties to buy formal care services (i.e. housekeepers to perform domestic help). Hence, they tend to turn to informal caregivers and this actually contributes to increasing the gap in the access to formal services between rich and poor and related inequalities.

Another factor contributing to the pro-rich inequality is the marital status. Indeed, non-single respondents are more concentrated among low-income groups (the generalized concentration indices are negative and significant in all three macro-areas) and they receive paid domestic help less often. As a result, the contribution to income-related inequality of being a non-single is positive and significant in all cases. Marital status can be in principle considered also as a need variable because single respondents are evidently more vulnerable to the need of domestic help. In this analysis we decided to consider only health problems or factors indirectly associated with such problems (demographics) among the needs variables. However, our results are not driven by this choice because needs-adjusted inequalities in favor of the rich would emerge also if we included marital status among the need variables.

Personal nursing care

Table 2.b shows the Erreygers index estimates, partial effects and inequality contributions by macro-areas for the utilization of professional home care.

(Table 2.b).

Both the EI and the ENA are positive, fairly small and statistically significant for the Continental model only. However, the decomposition exercise highlights some important differences across macro-area. Indeed,

in the Northern Europe model we found that income is negatively associated with access to home care services while it is positively associated to the same services in the Continental and Southern Europe model. Needs are distributed pro-poor in all areas. As a consequence we did not find horizontal inequity in the Northern Europe model while we found pro-rich inequality in the other areas even though the inequality is very small and statistically significant in the Continental area only.

Concerning the non-need variables, we found that less educated individuals consume a lower amount of formal care in Continental and Southern Europe and this contributes positively to pro-rich inequality in these areas. This is in line with the differences in the direct effect of income on the use of care across areas, as discussed before. The contribution of informal care to overall inequalities is rather modest and this is mostly due to a low substitutability between any kind of informal help and personal nursing care which is a "skilled" and more professional type of care.

To check the robustness of the results discussed above, we also use wealth and lagged income as living alternative standard variables used to rank individuals. Moreover, we also check for the relevance of the individual attitudes towards parent's care, changing the specification of the probit/bivariate probit model used for the decomposition. Our main results remain substantially unchanged. All details of these robustness checks are reported in the Appendix II.

5. Conclusions

The purpose of the present study was to investigate the degree and the determinants of income-related inequality in the use of home care services among older people across three macro-areas in Europe which are highly heterogeneous in terms of the degree of public financing of LTC and the strength and the social value of family ties. Our analysis allows to shed light on the role these factors in shaping income-related inequalities in the use of LTC services. In order to analyze equity issues related to the provision of home care services, the empirical model is estimated by considering separately skilled (nursing care) and low-skilled (paid domestic help) formal home care. Since in both cases the measure for formal home care access is a binary variable, indicating whether or not respondents had any formal home care utilization, we used the Erreygers (2009) corrected version of the concentration index. We decomposed the Erreygers index into the contribution of income, need and non-need factors. Among the non-need factors, we included informal care. We addressed how informal care by children and formal home care interact, building Erreygers index decomposition on a recursive bivariate probit model which controls for the potential simultaneity between formal home care and informal care.

Using cross-country comparative micro-data from SHARE (Survey of Health, Ageing and Retirement in Europe), we find important differences between the kind of care analyzed ("skilled" vs "unskilled") and the three macro-areas considered. Concerning the kind of care, we found substantial horizontal equity in the use

of skilled home care (with the exception of Continental Europe) while we detect significant pro-rich inequalities in the use of low-skilled domestic care in Continental and Southern Europe. In all areas, informal care services instead seem to act as a sort of safety net for the poor: in particular, we found that informal care substitutes for low-skilled formal care and appears to be disproportionately concentrated among the worse-off, contributing to increase the gap in the access to these services between rich and poor individuals.

With respect to the differences between the three areas, our results show that in the Northern European model there is no violation of the horizontal equity principle in the provision of home care services. In these countries, indeed, elderly needs for personal and domestic help are expected to be met by the state which provides high public spending on universal services equitable for all, including LTC public coverage. On the other side, we found that in the Continental European model, it appears that disadvantaged groups tend to face more difficulties in using home-based healthcare services. This result is also in accordance with the Esping-Andersen approach in which conservative countries tend to preserve social inequality and limit the re-distributive process. Finally, we found important inequities especially in the Southern European model (i.e. Italy, Greece and Spain), characterized by highly privatized LTC systems and an extensive role of family in the provision of LTC services.

Our results indicate that a higher involvement of the state in the LTC sector is correlated with a more equitable access to LTC services. Instead, when the provision of public LTC coverage is poor, important pro-rich inequalities may arise. To this respect, the situation seems to be particularly worrying for the Southern European Countries in which LTC public insurance is weak and informal support for the elderly until today has been pivotal (Costa Font and Zigante, 2014). However, the de-familiarization process that is affecting Southern European countries, also due to a higher women's labor force participation, is threatening the "Southern family model" and unpaid care provided by relatives can no longer be taken for granted. More generally, the increasing demand for care, in combination with a reduced potential for informal care, is likely to result in a need to expand LTC public coverage. A higher involvement of the State in the financing of LTC services may produce important social benefits. On one side, it may be desirable to guarantee equity in the access to LTC services. On the other side, it may encourage the labour market supply of children who are too often engaged in informal care assistance to their elderly parents. In our analysis, we show that the recourse to informal care is more pronounced for the "unskilled" type of care. For this reason, public resources to LTC sector might be more concentrated on this kind of care in the future.

Of course the complete replacement of informal care by formal care is not financially feasible, since the public financial resources available to pay for public long term care assistance are continuously decreasing (Costa-Font, 2010). An interesting compromise to the trade-off between equity of access and public expenditure in LTC sector is represented by the community care which is less costly than institutional LTC care and appears as a sensible way of responding to elderly people's needs while also averting demographic and economic crisis (Aroson and Neysmith, 1997; Chan et al., 2008). Several European countries are aiming to stimulate community living and care, including home care, as a sustainable approach to ease the burden of

care on family members and to prevent the need for long-term institutionalization in order to maintain individuals in their home and community as long as possible. The Elderly are thought to prefer being cared for in their own homes where they are presumed to be surrounded by family, friends, and others who know and understand them. Probably, a re-arrangement of LTC sector in this sense might be necessary to view of the already urgent problem of demographic ageing, which is inevitably destined to become more pronounced in the near future.

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APPENDIX I

A Bivariate Model for Formal and Informal home care

In the probit model used to capture the determinants of home care use, and to predict need standardized home care access, we included, among the dependent variables, having received informal care. Informal care may substitute for formal care but may be also a complement to formal care when the elderly suffer from severe disability and their needs are likely to exceed informal care resources (Balia and Brau, 2013). In this application, the situation is complicated by the fact that informal care and formal home care may be simultaneously determined (Van Houtven and Norton, 2004). This may be due to the fact that the receipt of informal care may be correlated to unobserved health characteristics or to unobserved preferences for care that are likely to influence the demand for home care (Charles and Sevak, 2005). Thus, in order to test for the potential endogeneity of informal care we run a recursive bivariate probit model (Cappellari and Jenkins, 2003). This allows us to draw more robust conclusions about the extent of horizontal inequity in home care.

The recursive structure of the bivariate probit model builds on a first structural form equation determining the receipt of formal home care and a second reduced form equation for the potentially endogenous dummy measuring the receipt of informal care. Thus:

$$\begin{aligned} y_{1i}^{*} &= b_1' x_{1i} + e_{1i} = d_2 y_{2i} + a' z_i + e_{1i} \\ y_{2i}^{*} &= b_2' x_{2i} + e_{2i} \end{aligned} \qquad (1A)$$

where z_i and x_{2i} are vectors of exogenous variables, α and β_2 are parameter vectors, δ_2 is a scalar parameter. ε_{1i} and ε_{2i} are the error terms distributed as bivariate normal, each with a mean zero and a variance covariance matrix Σ . Σ has values of 1 on the leading diagonal and correlations $\rho_{1,2} = \rho_{2,1}$ on off-diagonal elements. In the above setting, the exogeneity condition is stated in terms of the correlation coefficient, which can be interpreted as the correlation between the unobservable explanatory variables of the

two equations. The equations in (1A) can be estimated separately as single probit model only in the case of independent error terms, i.e. the correlation coefficient is not significantly different from zero. The parameters of the equations are not identified if z_i includes all the variables in x_{2i}. Estimation requires some considerations for the identification of the model parameters. Maddala (1983) proposes that at least one of the reduced-form exogenous variables (x_{2i}) not be included in the structural equations as explanatory variables. Following Maddala's approach we impose exclusion restrictions. For the reduced form (i.e. informal care equation), we use a variable assumed to affect directly only informal care but not the probability of receiving formal home care. In particular, for the reduced form we use the children's gender as the main explanation for the informal care received by the elderly (see also Bonsang, 2009). We consider gender composition of the children by using the proportion of daughters over the total number of children within the household. Following Bonsang (2009), we assume that the proportion of daughters directly affects only informal care but not the probability of receiving formal home care. Many studies show that daughters provide more care to their parents than do sons (see, for instance, Horowitz, 1985).

APPENDIX II

Robustness and Sensitivity Check

The final part of the analysis assesses the robustness of our results. Firstly, we used an alternative specification of the model in which we measured socioeconomic differences in the use of homecare services by wealth (i.e., accumulated assets) instead of income. Indeed, among elderly, current income and occupation status tend to lose their significance and wealth might be a more reliable measure of elderly socio-economic status (Alessie et al., 1997; Van Ourti, 2003; Allin et al., 2009). We defined the accumulated assets as the sum value of the primary residence net of mortgage, value of other real estate, owned share of own business, owned cars, and the value of financial assets (bank accounts, government and corporate bonds, stocks, mutual funds, individual retirement accounts, and contractual savings for housing and life insurance policies owned by the household) minus financial liabilities. We used the modified OECD equivalence scale to calculate individual wealth for equivalent adults.

From Table A that shows the distribution of wealth across income quintile, it arises that wealth is more equally distributed in Northern and Continental Europe. However, even though the ranking based on wealth may be slightly different from the ranking based on current income, the degree of wealth-related inequality in the use of homecare services remains very similar to the degree of income-related inequality. The only exception is represented by Northern European countries where we found significant wealth-related inequality in the use of home care services favoring slightly the poor. However, our main results remain substantially unchanged: a strong North-South gradient emerges again for paid domestic help (see Table B).

Table A: Distribution of Wealth across income quintiles

Northern macroa-area Wealth	Income	%	Cum.
Lowest wealth quintile	Lowest quintile	23,38	23,38
	Second quintile	22,00	45,38
	Third quintile	18,47	63,85
	Fourth quintile	22,79	86,64
	Highest quintile	13,36	100,00
Second wealth quintile	Lowest quintile	24,02	24,02
	Second quintile	25,00	49,02
	Third quintile	19,12	68,14
	Fourth quintile	15,20	83,33
	Highest quintile	16,67	100,00
Third wealth quintile	Lowest quintile	13,47	13,47
	Second quintile	20,82	34,29
	Third quintile	20,00	54,29
	Fourth quintile	23,67	77,96
	Highest quintile	22,04	100,00
Fourth wealth quintile	Lowest quintile	16,63	16,63
	Second quintile	15,93	32,55
	Third quintile	21,55	54,10
	Fourth quintile	20,61	74,71
	Highest quintile	25,29	100,00
Highest wealth quintile	Lowest quintile	11,28	11,28
	Second quintile	17,94	29,22
	Third quintile	21,65	50,88
	Fourth quintile	25,30	76,17
	Highest quintile	23,83	100,00

Continental macroa-area Wealth	Income	%	Cum.
Lowest wealth quintile	Lowest quintile	19,61	19,61
	Second quintile	24,13	43,74
	Third quintile	23,90	67,63
	Fourth quintile	20,88	88,52
	Highest quintile	11,48	100,00
Second wealth quintile	Lowest quintile	12,63	12,63
	Second quintile	24,81	37,44
	Third quintile	22,96	60,40
	Fourth quintile	24,65	85,05
	Highest quintile	14,95	100,00
Third wealth quintile	Lowest quintile	8,12	8,12
	Second quintile	18,04	26,16
	Third quintile	25,63	51,79
	Fourth quintile	25,21	77,00
	Highest quintile	23,00	100,00
Fourth wealth quintile	Lowest quintile	4,85	4,85
	Second quintile	9,59	14,44
	Third quintile	18,53	32,97
	Fourth quintile	28,66	61,64
	Highest quintile	38,36	100,00
Highest wealth quintile	Lowest quintile	1,50	1,50
	Second quintile	8,65	10,15
	Third quintile	7,52	17,67
	Fourth quintile	14,29	31,95
	Highest quintile	68,05	100,00

Southern macroa-area Wealth	Income	%	Cum.
Lowest wealth quintile	Lowest quintile	53,03	53,03
	Second quintile	21,29	74,32
	Third quintile	13,15	87,47
	Fourth quintile	7,72	95,20
	Highest quintile	4,80	100,00
Second wealth quintile	Lowest quintile	47,94	47,94
	Second quintile	24,87	72,81
	Third quintile	15,01	87,81
	Fourth quintile	7,15	94,96
	Highest quintile	5,04	100,00
Third wealth quintile	Lowest quintile	30,99	30,99
	Second quintile	25,95	56,95
	Third quintile	20,92	77,86
	Fourth quintile	13,59	91,45
	Highest quintile	8,55	100,00
Fourth wealth quintile	Lowest quintile	17,24	17,24
	Second quintile	24,34	41,58
	Third quintile	21,70	63,29
	Fourth quintile	18,05	81,34
	Highest quintile	18,66	100,00
Highest wealth quintile	Lowest quintile	14,29	14,29
	Second quintile	12,99	27,27
	Third quintile	10,39	37,66
	Fourth quintile	16,23	53,90
	Highest quintile	46,10	100,00

*SHARE wave 2, release 2.5.0, number of obs: 9239.

Table B: Erreygers Index by macro-area: Personal home care (wealth)

	North	Continental	South
	Biprobit	Probit	Probit
EI (*predicted*)	**-0,0663**	**-0,0417**	-0,0107
ENA	**-0,0587**	-0,0034	-0,0032

Erreygers Index by macro-area: Paid domestic help (wealth)

	North	Continental	South
	Biprobit	Biprobit	Probit
EI (*predicted*)	**-0,182**	-0,015	0,0132
ENA	**-0,177**	-0,0101	**0,0242**

*SHARE wave 2, release 2.5.0, number of obs: 9239

As a second robustness check, we tried to deal with the endogenous nature of income-home care services relationship. Indeed, the potential simultaneity between income and homecare service utilization may introduce a reverse causality problem: a higher income might facilitate access to home care service but the recourse to paid domestic help and nursing care may, in turn, influence current income. The association between homecare services use and income may partly be due also to unobserved third factors, which may drive income and homecare access simultaneously. Reliable estimates of the income elasticity of homecare access therefore have to take account of these potential endogeneity problems. Hence, as a further robustness check we use the lagged income, instead of the current income, as a living standard variable used to rank individuals. We employed the modified OECD equivalence scale to calculate individual income for equivalent adults using income information from wave 1, collected in 2004. This implies that we included in our sample only respondents who participated in both waves. The new sample included 6854 observations. Unlike the 2006 wave, the 2004 wave of SHARE collects gross disposable income, i.e. before taxes and transfers. This should not affect substantially the ranking of individuals within countries as re-ranking phenomena are likely to be very limited within European countries analyzed in our paper.

Table C shows that our main results are substantially unchanged and consistent with those obtained from the model using wealth as living standard variable: again we found a North- South gradient in the paid domestic help with horizontal inequity which favor the rich in the Southern countries.

Table C: Erreygers Index by macro-area: Personal home care (lag-income wave 1)

	North	Continental	South
	Probit	Probit	Probit

EI (*predicted*)	-0,0027	-0,0128	0,0012
ENA	0,0031	0,0005	0,006

Erreygers Index by macro-area: Paid domestic help (lag-income wave 1)

	North	Continental	South
	Biprobit	Biprobit	Probit
EI (*predicted*)	**-0,105**	0.0222	**0,0405**
ENA	**-0,103**	0,025	**0,0507**

*SHARE wave 1 and 2, release 2.5.0, number of obs: 6854.

Finally, we also included in the probit/bivariate model an indicator which describes the different attitudes towards parent's care. The latter might be correlated with income status and this might bias the estimates of income-related inequalities in home care use. We use a variable that is available in an additional "drop-off" SHARE questionnaire. Among others, the respondents are required to express their opinion on who - the family or the State (on a scale from 1 to 5 - totally family; mainly family; both equally; mainly State; totally State) should bear the responsibility for each of the following tasks: help with household chores for older persons who are in need (such as help with cleaning, washing); personal care for older persons who are in need (such as nursing or help with bathing or dressing). Unfortunately, including this information in the probit model greatly reduces the dimension of our sample (4819 vs 9239 observations of the original sample) due to the high rate of non-response in the drop-off questionnaire (more than 31% of the respondents did not answer these questions). However, the inclusion of thi additional control does not change our main results (see Table D).

Table D: Erreygers Index by macro-area: Personal care (family values as a control)

	North	Continental	South
	Probit	Biprobit	Probit
EI (*predicted*)	-0,01	-0,0118	0,0234
ENA	-0,008	-0,0117	**0,0256**
Help chores			
Partial effect	0,0001	-0,0018	-0,0001
CI	-0,007	0,007	0,014
Contribution	-0,0002	-0,0002	-0,0007
Help personal care			
Partial effect	0,0006	0,0058	0,0005
CI	**-0,012**	0,002	0,013
Contribution	**0,003**	-0,001	0,0001

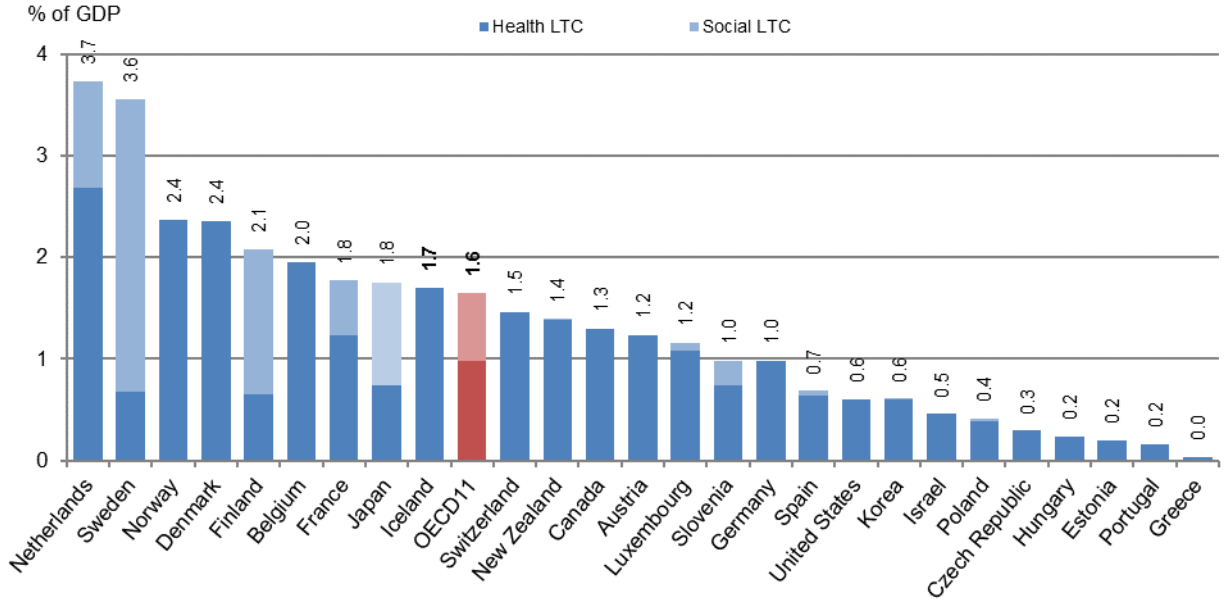
Erreygers Index by macro-area: Paid domestic help (family values as a control)

	North	Continental	South
	Biprobit	Biprobit	Probit
EI (*predicted*)	-0,0018	**0,0465**	**0,064**
ENA	-0,0006	**0,0461**	**0,067**
Help chores			
Partial effect	0,0016	-0,0005	**0,007**
CI	-0,007	0,007	0,014
Contribution	0,0003	0,0001	-0,0009
Help personal care			
Partial effect	-0,0018	0,0007	**-0,0052**
CI	-0,012	0,002	0,0132
Contribution	0,0015	-0,0001	0,0012

*SHARE, wave 1 and 2, release 2.5.0, number of obs: 4819.

APPENDIX III

Figure 1. Long-term care public expenditure (health and social components), as share of GDP, 2011 (or nearest year)



Note: The OECD average only includes the 11 countries that report health and social LTC.

Source: *OECD Health Statistics 2013*, http://dx.doi.org/10.1787/health-data-en.

Table 1a: Descriptive Statistics, overall sample

Variable	Description	Mean	Sd	Min	Max
Utilization					
Personal nursing care	1 if having received any of the following forms of home care during the last 12 months: (1) Professional or paid nursing or personal care; (2) Meals on wheels	0,078	0,268	0	1
Paid Domestic Help	1 if having received Professional or paid home help, for domestic tasksn that you could not perform yourself due to health problems.	0,092	0,289	0	1
Need Variables					
Age	Age in years	74,15	6,28	66	104
Female	1 if female	0,53	0,49	0	1
Health conditions	Number of health conditions out of 10 listed	2,03	1,6	0	10
Self-reported health	Self-reported health on a scale from 1 to 5 (1=excellent; 5=bad)				
1. excellent		.065	.248	0	1
2. very good		.140	.347	0	1
3. good		.364	.481	0	1
4. fair		.310	.462	0	1
5. poor		.117	.322	0	1
Symptoms	Number of symptoms out of 11 listed	2,03	2	0	11
Mobility	Number of functional limitations out of 10 listed	2,06	2,46	0	10
Non-Need Variables					
Equivalent Income		4337,84	7553,73	83,67	330955
Informal care	1 if having received (on a weekly basis) any of the following forms of informal care during the last 12 months: (1) Personal care; (2) Practical household help; (3) Help with paperwork.	0,04	0,21	0	1
Low_Education		0,6	0,48	0	1
Medium_Education		0,24	0,43	0	1

High_Education		0,14	0,35	0	1
Retired	1 if respondent is retired	0,83	0,37	0	1
Rural		0,48	0,49	0	1

Number of observations: 9239

Table 1.b: Descriptive Statistics, Northen Europe

Variable		Mean	Sd	Min	Max
Dependent Variables:					
Personal nursing care		.058	.234	0	1
Paid Domestic Help		.119	.324	0	1
Need variables					
Age		74.3	6.42	66	98
Female		.514	.499	0	1
Health conditions		1.977	1.617	0	10
Self-reported health:					
1. excellent		.126	.332	0	1
2. very good		.197	.398	0	1
3. good		.341	.474	0	1
4. fair		.264	.441	0	1
5. poor		.068	.253	0	1
Symptoms		1.74	1.83	0	11
Mobility		1.413	1.97	0	10
Non-Need Variables					
Equivalent Income		4093.80	4979.91	416.37	91208.48
Informal care		.036	.187	0	1
More than 10 hours per week	8.11%				
More than 20 hours per week	3.36%				
Low_Education		.537	.498	0	1
Medium_Education		.265	.441	0	1
High_Education		.193	.395	0	1
Retired		.901	.297	0	1
Rural		.364	.481	0	1

Number of observations: 2812

Table 1.c: Descriptive Statistics, Continental Europe

Variable		Mean	Sd	Min	Max
Dependent Variables:					
Personal nursing care		.125	.331	0	1
Paid Domestic Help		.106	.308	0	1
Need variables					
Age		74.22	6.28	66	100
Female		.551	.497	0	1
Health conditions		1.93	1.50	0	10
Self-reported health:					
1. excellent		.044	.205	0	1
2. very good		.125	.330	0	1
3. good		.397	.489	0	1
4. fair		.309	.462	0	1
5. poor		.124	.329	0	1
Symptoms		2.14	1.98	0	11
Mobility		2.10	2.49	0	10
Non-Need Variables					
Equivalent Income		5498.42	8915.73	83.67	250953
Informal care		.0572	.232	0	1
More than 10 hours per week	20.53%				
More than 20 hours per week	10.68%				
Low_Education		.468	.499	0	1
Medium_Education		.341	.474	0	1
High_Education		.185	.388	0	1
Retired		.865	.341	0	1
Rural		.568	.495	0	1

Number of observations: 3653

Table 1.d: Descriptive Statistics, Southern Europe

Variable		Mean	Sd	Min	Max
Dependent Variables:					
Personal nursing care		.035	.185	0	1
Paid Domestic Help		.047	.212	0	1
Need variables					
Age		73.92	6.12	66	104
Female		.518	.499	0	1
Health conditions		2.23	1.69	0	10
Self-reported health:					
1. excellent		.0324	.177	0	1
2. very good		.104	.305	0	1
3. good		.345	.475	0	1
4. fair		.360	.480	0	1
5. poor		.157	.364	0	1
Symptoms		2.18	2.16	0	11
Mobility		2.681	2.689	0	10
Non-Need Variables					
Equivalent Income		3056.90	7535.48	97.30	330955
Informal care		.046	.211	0	1
More than 10 hours per week	41%				
More than 20 hours per week	28.22%				
Low_Education		.847	.359	0	1
Medium_Education		.103	.30	0	1
High_Education		.049	.21	0	1
Retired		.715	.451	0	1
Rural		.485	.499	0	1

Number of observations: 2774

Table 2.a : Contributions to Inequality in the probability of using Paid Domestic Help

	North	Continental	South
	Biprobit	Biprobit	Biprobit
EI (*predicted*)	0.0316	**0.0714**	**0.0485**
ENA	0.0325	**0.0710**	**0.0506**
EI (*residual*)	0.0333	0.0695	0,0492
Income			
Partial effect	-0.0001	-0.0001	-0.0001
CI	**0.4553**	**0.4975**	**0.5228**
Contribution	-0.0042	-0.0088	-0.0074
Contribution of income			
Need Variables			
Age			
Partial effect	**0.0012**	**0.0013**	**0.0010**
CI	-0.0006	**0.0036**	-0.0015
Contribution	-0.0002	**0.0014**	**-0.0004**
SPHS			
Partial effect	**0.0017**	**0.0015**	**0.0039**
CI	**-0.0072**	**-0.0072**	**-0.0108**
Contribution	-0.0001	-0.0001	**-0.0006**
Mobility			
Partial effect	**0.0032**	**0.0028**	**0.0015**
CI	-0.0150	**-0.0268**	**-0.0352**
Contribution	-0.0002	-0.0006	**-0.0005**
Symptoms			
Partial effect	0.0013	**0.0015**	0.0009
CI	**-0.0223**	**-0.0162**	**-0.0269**
Contribution	-0.00021	**-0.0002**	-0.0002
Health_conditions			
Partial effect	**0.0004**	0.0008	**0.0021**
CI	-0.0156	-0.0066	**-0.0108**
Contribution	0.0000	-0.0001	-0.0002
Female			
Partial effect	**-0.0009**	**0.0012**	-0.0010
CI	0.0005	0.0123	**0.0204**
Contribution	0.0000	0.0000	-0.0001
Contribution of need-factors	***-0.0009***	***0.0004***	***-0.0021***
Non- need Variables			
Informal			
Partial effect	**-0.0075**	**-0.0093**	**-0.0131**
CI	**-0.1684**	**-0.1688**	-0.0264
Contribution	0.0001	**0.0003**	0.0001
Low_education			
Partial effect	0.0018	**-0.0025**	0.0073
CI	**-0.0434**	**-0.0875**	**-0,0599**
Contribution	-0.0001	0.0004	**-0.0015**

High_education			
Partial effect	-0.0048	-0.0069	0.0013
CI	**0.1269**	**0.1918**	**0.4077**
Contribution	-0.0004	-0.0009	-0.0001
Living with someone			
Partial effect	**-0.0229**	**-0.0361**	**-0.0327**
CI	**-0.0795**	**-0.1014**	**-0.1018**
Contribution	**0.0050**	**0.0095**	**0.0094**
Retired			
Partial effect	-0.0029	-0.0022	-0.0041
CI	**-0.0124**	**0.0329**	**0.0408**
Contribution	0.0001	-0.0002	-0.0004
Rural			
Partial effect	-0.0029	0.0002	**-0.0073**
CI	**-0.1123**	**-0.0593**	**-0.0669**
Contribution	0.0004	-0.0001	**0.0009**
Contribution of non-need factors	***0.0051***	***0.0090***	***0.0083***
Country fixed-effects: contributions	***-0.0017***	***0.0013***	***0.0005***

Notes: Decomposition based on a linear approximation using the average marginal effects from recursive bivariate probits. Significant β, EI and contributions in bold (P<0.1)

All models include country dummies.
Estimated correlation coefficients of Domestic help equation:
- North: **0.659** (0.198)
- Continental: **0.699** (0.136)
- South: **0.894** (0.071)

Table 2.b : Contributions to Inequality in the probability of using Personal home care

	North	Continental	South
	Biprobit	Probit	Probit
EI (*predicted*)	0.0023	0.0102	0.0024
ENA	0.0036	**0.0122**	0.0059
EI (*residual*)	0,0037	-0.0086	-0,0057
Income			
Partial effect	-0,0002	0.0001	0.0001
CI	**0.4553**	**0.4975**	**0.5228**
Contribution	-0.0039	0.0047	0.0006
Contribution of income			
Need Variables			
Age			
Partial effect	**0.0014**	**0.0049**	**0.0009**
CI	-0.0006	**0.0036**	-0.0015
Contribution	-0.0002	**0.0053**	-0.0004
SPHS			
Partial effect	**0.0017**	**0.0255**	**0.0053**
CI	**-0.0072**	**-0.0072**	**-0.0108**
Contribution	-0.0001	**-0.0024**	**-0.0008**
Mobility			
Partial effect	**0.0052**	**0.0156**	**0.0034**
CI	**-0.0150**	**-0.0268**	**-0.0352**
Contribution	-0.0004	**-0.0035**	**-0.0013**
Symptoms			
Partial effect	0.0024	**0.0042**	**0.0019**
CI	**-0.0223**	**-0.0162**	**-0.0269**
Contribution	-0.0003	-0.0005	**-0.0004**
Health_conditions			
Partial effect	-0.0003	0.0041	0.0002
CI	**-0.0156**	-0.0066	**-0.0108**
Contribution	0.0000	-0.0002	-0.0001
Female			
Partial effect	-0.0073	**-0.0206**	**-0.0108**
CI	0.0005	0.0123	0.0203
Contribution	-0.0001	-0.0005	-0.0004
Contribution of need-factors	***-0.0011***	***-0.0019***	***-0.0035***
Non- need Variables			
Informal			
Partial effect	**-0.0155**	0.0255	-0.0016
CI	**-0.1684**	**-0.1688**	-0.0264
Contribution	0.0003	-0.0009	0.0000
Low_education			

Partial effect	**0.0043**	**-0.0212**	**-0.0202**
CI	**-0.0434**	**-0.0875**	**-0.0599**
Contribution	-0.0004	**0.0034**	**0.0041**
High_education			
Partial effect	-0.0122	**-0.0256**	-0.0049
CI	**0.1269**	**0.1918**	**0.4077**
Contribution	-0.0011	**-0.0036**	-0.0003
Living with someone			
Partial effect	**-0.0281**	**-0.0437**	-0.0001
CI	**-0.0795**	**-0.1014**	**-0.1018**
Contribution	0.0061	**0.0115**	0.0000
Retired			
Partial effect	-0.0093	0.0046	**-0.0151**
CI	**-0.0124**	**0.0329**	**0.0408**
Contribution	0.0004	0.0005	**-0.0017**
Rural			
Partial effect	-0.0045	0.0135	**-0.0087**
CI	**-0.1123**	**-0.0593**	**-0.0669**
Contribution	0.0007	-0.0018	0.0011
Contribution of non-need factors	***0.0060***	***0.0091***	***0.0031***
Country fixed-effects: contributions	***-0.0025***	***0.0069***	***0.0025***

Notes: Decomposition based on a linear approximation using the average marginal effects from univariate and bivariate probits. Significant β, EI and contributions in bold (P<0.1)

All models include country dummies.

Estimated correlation coefficients of Personal home care equation:

- North: **0.766** (0.205)
- Continental: 0.04 (0.22)
- South: 0.512 (0.262)

Table 3.a: Paid domestic help: Marginal effects from probit and biprobit models

Northern Europe	(1)		(2)	
Equivalent income	0.000	(0.000)	0.0001	(0.000)
Informal care	0.032*	(0.019)	-0.0075***	(0.352)
Fraction of daughters			0.0037*	(0.132)
Age	0.006***	(0.000)	0.0012***	(0.006)
Female	0.016**	(0.007)	-0.0009*	(0.09)
Self-perceived health	0.018***	(0.003)	0.0017**	(0.045)
Mobility	0.013***	(0.001)	0.0032***	(0.019)
Health conditions	0.004*	(0.002)	0.0004*	(0.026)
Symptoms	0.000	(0.001)	0.0013	(0.024)
Low education	0.000	(0.007)	0.0018	(0.094)
High education	0.005	(0.011)	-0.0048	(0.126)
Non-single living	-0.083***	(0.012)	-0.0229***	(0.084)
Retired	0.002	(0.010)	0.011	(0.134)
Rural	-0.009	(0.006)	-0.0029	(0.083)
Sweden	-0.071***	(0.009)	-0.093***	(0.12)
Denmark	- 0.014*	(0.007)	-0.021*	(0.105)

Notes: The coefficients reported are marginal effects from probit and biprobit models. Standard errors in brackets.

Estimated correlation coefficient for the recursive bivariate probit (*rho*)**: 0.659** (0.198)

Table 3.b: Paid domestic help: Marginal effects from probit and biprobit models

Continental Europe	(1)		(2)	
Equivalent income	0.000	(0.000)	-0.0001	(0.000)
Informal care	0.024*	(0.014)	-0.0093**	(0.242)
Fraction of daughters			0.009***	(0.103)
Age	0.0050***	(0.000)	0.0013***	(0.005)
Female	0.014*	(0.007)	0.0012*	(0.077)
Self-perceived health	0.0120**	(0.004)	0.0015**	(0.042)
Mobility	0.012***	(0.001)	0.0028***	0.015)
Health conditions	0.003	(0.002)	0.0008	(0.023)
Symptoms	0.005*	(0.001)	0.0015**	(0.019)
Low education	-0.018*	(0.007)	-0.0025*	(0.079)
High education	-0.006	(0.009)	-0.0069	(0.108)
Non-single living	-0.041***	(0.009)	-0.0361***	(0.080)
Retired	-0.003	(0.009)	-0.0022	(0.090)
Rural	-0.004	(0.006)	0.0002	(0.065)
Austria	-0.038***	(0.005)	-0.0713***	(0.113)
France	0.0160*	(0.006)	-0.027***	(0.081)
Germany	-0.058***	(0.006)	-0.008***	(0.113)

Notes: The coefficients reported are marginal effects from probit (1)and biprobit models (2). Standard errors in brackets.

Estimated correlation coefficient for the recursive bivariate probit (*rho*): **0.699** (0.136)

Table 3.c: Paid domestic help: Marginal effects from probit and biprobit models

Southern Europe	(1)		(2)	
Equivalent income	0.000	(0.000)	-0.0001	(0.000)
Informal care	0.005	(0.008)	-0.0131***	(0.191)
Fraction of daughters			0.0002*	(0.113)
Age	0.001***	(0.000)	0.0010***	(0.006)
Female	0.007	(0.005)	-0.0010	(0.111)
Self-perceived health	0.009***	(0.003)	0.0039***	(0.065)
Mobility	0.003***	(0.001)	0.0015***	(0.070)
Health conditions	0.003*	(0.001)	0.0021*	(0.030)
Symptoms	0.001	(0.001)	0.0009	(0.024)
Low education	-0.011	(0.009)	0.0073	(0.182)
High education	-0.003	(0.013)	0.0013	(0.295)
Non-single living	-0.014***	(0.007)	-0.0327***	(0.097)
Retired	0.004	(0.004)	-0.0041	(0.107)
Rural	-0.012**	(0.004)	-0.0073***	(0.093)
Italy	0.018	(0.005)	0.001	(0.113)
Greece	0.021***	(0.005)	-0.057	(0.146)

Notes: The coefficients reported are marginal effects from probit and biprobit models.
Standard errors in brackets.

Estimated correlation coefficient for the recursive bivariate probit (*rho*): **0.894** (0.071)

Table 4.a: Personal care: Marginal effects from probit and biprobit models

Northern Europe	(1)		(2)	
Equivalent income	0.000	(0.000)	-0.0002	(0.000)
Informal care	0,017**	(0.013)	-0.0155**	(0.101)
Fraction of daughters			.0080*	(.116)
Age	0,001***	(0.000)	0.0014***	(0.006)
Female	-0,001	(0,004)	-0.0073	(0.091)
Self-perceived health	0,008***	(0,002)	0.0017***	(0.051)
Mobility	0,004***	(0,001)	0.0052***	(0.02)
Health conditions	0,001	(0,001)	-0.0003	(0.028)
Symptoms	0.000	(0,001)	0.0024	(0.023)
Low education	0,006	(0,004)	0.0043*	(0.104)
High education	0,005	(0,007)	-0.0122	(0.143)
Non-single living	-0,021***	(0,005)	-0.0281***	(0.091)
Retired	0,001	(0,006)	-0.0093	(0.152)
Rural	0,000	(0,004)	-0.0045	(0.088)
Sweden	-0,025***	(0,004)	-0.007***	(0.12)
Denmark	0,0050*	(0,006)	0.0018	(0.117)

Notes: The coefficients reported are marginal effects from probit and biprobit models.
Standard errors in brackets.

Estimated correlation coefficient for the recursive bivariate probit (*rho*): **0.766** (0.205)

Table 4.b: Personal care: Marginal effects from probit and biprobit models

Continental Europe	(1)		(2)	
Equivalent income	0.0001	(0.000)	-0.0001	(0.000)
Informal care	0.0255	(0.018)	0.0003	(0.337)
Fraction of daughters			0.0024***	(0.104)
Age	0.0049***	(0.000)	0.0002***	(0.005)
Female	-0.0206*	(0.009)	-0.0007	(0.023)
Self-perceived health	0.0255***	(0.005)	0.0007***	(0.04)
Mobility	0.0156***	(0.002)	0.0007***	(0.01)
Health conditions	0.0041	(0.003)	0.0002	(0.023)
Symptoms	0.0042*	(0.002)	0.0003*	(0.019)
Low education	-0.0212*	(0.009)	-0.0008*	(0.071)
High education	-0.0256*	(0.011)	-0.0015*	(0.103)
Non-single living	-0.0437***	(0.011)	-0.0086***	(0.08)
Retired	0.0046	(0.012)	-0.0001	(0.094)
Rural	0.0135	(0.008)	0.0004	(0.063)
Austria	-0.808***	(0.007)	-0.0020***	(0.116)
France	0.167*	(0.008)	-0.0011*	(0.074)
Germany	-0.021***	(0.008)	-0.0026***	(0.104)

Notes: The coefficients reported are marginal effects from probit (1) and biprobit models (2). Standard errors in brackets.

Estimated correlation coefficient for the recursive bivariate probit (*rho*): 0.044 (0.179)

Table 4.c: Personal care: Marginal effects from probit and biprobit models

Southern Europe	(1)		(2)	
Equivalent income	0.0001		-0.0001	(0.000)
Informal care	-0.0016	(0.005)	-0.0022*	(0.464)
Fraction of daughters			0.0011*	(0.264)
Age	0.0009***	(0.000)	0.0002***	(0.008)
Female	-0.0108*	(0.004)	-0.0024**	(0.145)
Self-perceived health	0.0053*	(0.002)	0.0010*	(0.082)
Mobility	0.0034***	(0.000)	0.0006***	(0.024)
Health conditions	0.0002	(0.000)	0.0002	(0.036)
Symptoms	0.0019*	(0.000)	0.0004*	(0.029)
Low education	-0.0202*	(0.010)	0.0000	(0.000)
High education	-0.0049	(0.005)	-0.0010	(0.326)
Non-single living	-0.0001	(0.003)	-0.0039	(0.150)
Retired	-0.0151***	(0.006)	-0.0038***	(0.138)
Rural	-0.0087**	(0.003)	-0.0022***	(0.113)
Italy	-0.005	(0.003)	-0.0157	(0.132)
Greece	-0.015***	(0.003)	-0.046***	(0.171)

Notes: The coefficients reported are marginal effects from probit and biprobit models.
Standard errors in brackets.

Estimated correlation coefficient for the recursive bivariate probit (*rho*): 0.471 (0.264)