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**The Quality of Life of Female Informal Caregivers:
From Scandinavia to the Mediterranean Sea**

CHE Research Paper 84

The quality of life of female informal caregivers: from Scandinavia to the Mediterranean Sea

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May 2013

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Acknowledgements

An earlier draft of this paper was presented at the annual meeting of the Italian Health Economics Association, Rome, Italy. The authors wish to thank the participants for useful comments received. We also thank Vincenzo Carrieri, Giacomo Pasini, Francesca Zantomio for useful suggestions. Financial support provided by Fondazione FarmaFactoring (Milan) for this research project is gratefully acknowledged. This research collaboration emerged as a result of Cinzia Di Novi being awarded an Alan Williams Fellowship to visit the Centre for Health Economics at the University of York. The usual disclaimer applies.

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Abstract

We analyse the impact of the provision of care on the health and quality of life (QoL) of mature female informal caregivers using a representative sample drawn from the Survey of Health, Ageing and Retirement in Europe (SHARE). We match each informal caregiver with a non-carer using Propensity Score matching and test whether matched individuals differ on self-assessed health and a functional indicator of QoL and whether this relationship differs across European regions. We find a North-South gradient both for self-assessed health and QoL and our results show that the provision of caregiving to close relatives in Europe impacts on the caregivers' quality of life and health in a way that depends on their geographical location, the degree of formal care and specific cultural and social factors of the area. We find that informal caregiving is a complex phenomenon which may bring both psychological rewards and distress to providers of care and this complexity, along with the geographical gradient highlight the importance of ensuring that policies match the needs of individual carers in their own geographical areas and cultural contexts.

Keywords: informal caregiving; quality of life; self-assessed health; Europe

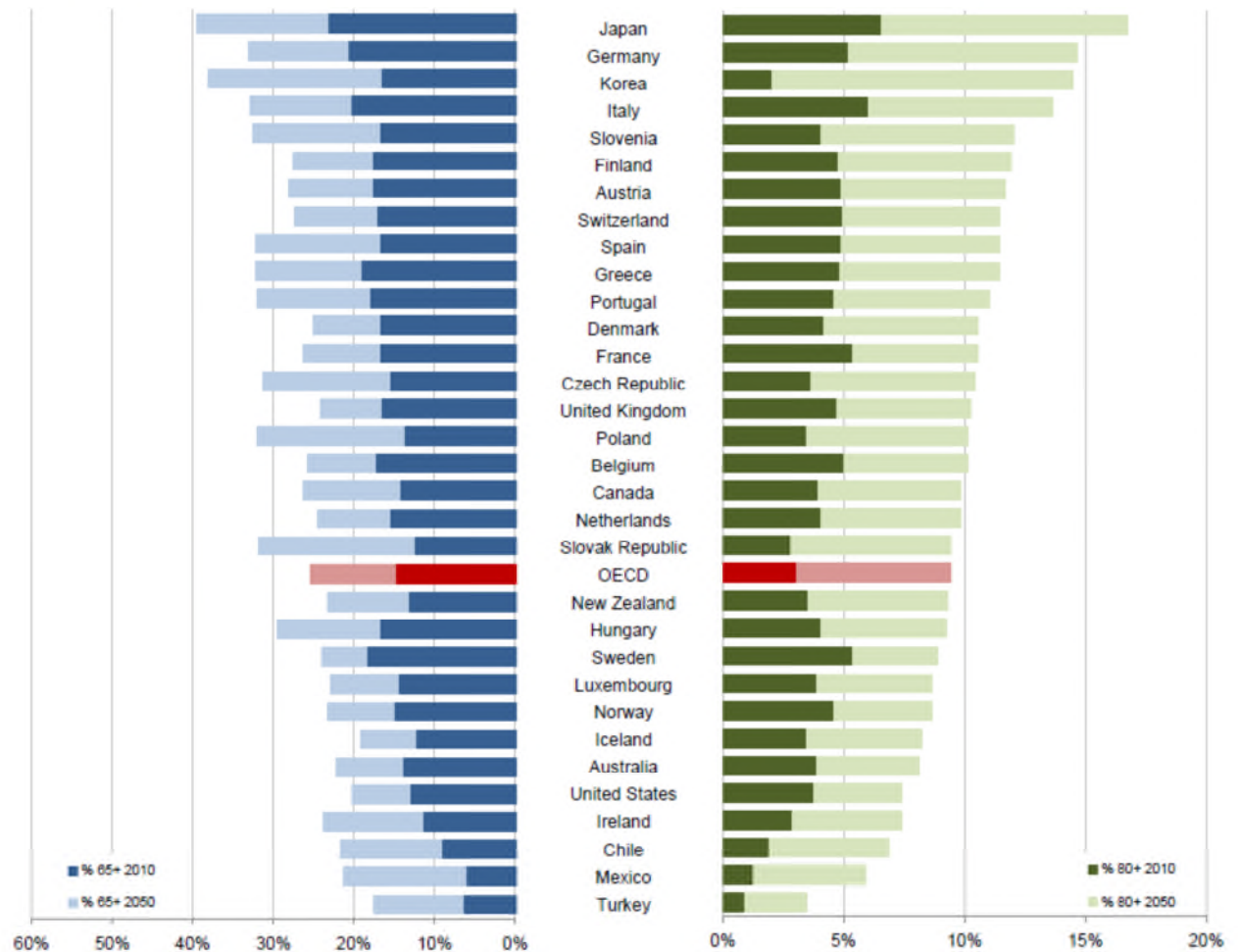
PsycINFO Classification code: 2900; 3000

JEL Classification code: I10; I12; D10

1. Introduction

The advances in medicine over the last half century have increased life expectancy in the Western world. Due to this increased life expectancy, but also to a particularly accentuated drop in birth rates, Europe is getting older: the population of Western Europe includes relatively more elderly people than any other region, with Germany and Italy having the largest proportion of over-65s after Japan with the highest proportion in the world as shown in Figure 1.

The shares of the population aged over 65 and 80 years in the OECD will increase significantly by 2050



Source: OECD Labour Force and Demographic Database, 2010.

Figure 1 Proportion of elderly population by country

Much literature has focused on the greater resource consequences of ageing populations such as increased hospitalization rates and the use of more formal and informal care services, even though, in recent years, disability prevalence rates have declined in several European countries (OECD, 2011). The ageing of the population and the greater longevity of individuals can be expected to lead to increasing numbers of older persons in need of long-term care. This need is partly met by professional (or formal) supply of caregiving (e.g. medical doctors, nurses) either in dedicated structures (e.g. hospitals, nursing homes) or at the elder’s home; but it is also met by relatives and friends (“informal caregivers”) who provide caregiving for the elderly. Of course formal and informal caregivers meet different needs of the elderly and in general tend to be complementary (Cantor,

1975; Litwak, 1985; Bass et al., 1996)¹. Adult children often provide their elderly parents with a series of services (shopping, dressing, toileting, meal preparation, etc.) that the elderly are no longer able to provide for themselves². However, for the informal caregivers this entails an allocation of some of their time to activities which are (for most of them) not related to their profession.

Donelan et al. (2002) point out that “research on informal caregiving has highlighted the intense emotional and physical burden on some caregivers” (pg. 222) and others point to the fact that the caregiving experience is a complex phenomenon. It impacts on all aspects of the caregiver’s life, including his or her physical, emotional and psychological health (Deeken et al., 2003). Indeed, in recent years, caregiving has been identified as “a chronic stressor that places caregivers at risk for physical and emotional problems” (Pinquart and Sörensen, 2006, pg. 33). Moreover, pressures of care giving are projected to intensify for the next quarter of a century due to ageing populations.

Different studies have focused on the degree of substitutability between formal and informal caregiving (see for example Lyons and Zarit, 1999 for a survey), the recipient’s characteristics that determine a more or less intensive use of either form, and the consequences (in both physical and psychological terms) of caregiving on the informal providers. They bear not only the physical burden of the care provided, but are also effectively linked to the recipient. This fact may bring psychological distress, although some studies find positive effects of caregiving on the individual well-being in terms of, for example, a sense of satisfaction (Scharlach, 1994; Ingersoll-Dayton et al., 2001; Lee et al., 2001).

On the economic side, the phenomenon is relevant and quantifiable in monetary terms. For example, Arno et al. (1999) estimated a value of \$196 billion in 1997 for informal caregiving in the USA only and van den Berg and Ferrer-i-Carbonell (2007) calculate an hourly value of 9-10 Euros in the Netherlands. These figures represent the sum of money that households (or governments) would have to spend if replacing informal with formal care. Informal caregiving thus represents massive savings for families and governments alike. However, it also represents costs to society in the form of negative externalities which may be translated into monetary terms. Indeed, since caregiving is stressful (Stenberg-Nichols and Junk, 1997; Hirst, 2003; Hirst, 2005; Rubin and White-Means, 2009), diseases such as cardiovascular problems (Gräsel, 2002) and depression (Lee et al., 2001; Gallicchio et al., 2002; Marks et al., 2002; Pinquart and Sörensen, 2007; Wilson et al., 2007; Hammer and Neal., 2008) are common among informal caregivers, although attending people in need may also be a source of happiness. In addition, caregivers may also be less productive at work and may have to bear the costs of foregone labour-market opportunities (Couch et al., 1999; Pezzin and Steinberg Schone, 1999; Henz, 2006; Keene and Prokos, 2007; Wilson et al., 2007; Bolin et al., 2008; Hammer and Neal., 2008; Pagani and Marenzi, 2008; Malach-Pines et al., 2009 and Álvarez and Miles-Touya, 2012), choosing, for instance, part-time rather than full-time jobs. These effects depend on gender, the socio-economic and marital status of the caregiver, as well as other individual characteristics. Increased physical and psychological illness as a result of caring, lower productivity or changes in preferences in the workplace all represent distortions of individual choices and therefore are a burden for society.

This paper analyses the impact of the provision of care on the health and quality of life (QoL) of mature female informal caregivers. We test whether this relationship differs across European regions according to a North–South gradient. While there is a strong emphasis on family throughout the continent, there is substantial evidence of cultural differences between Northern and Southern Europe which motivate such a focus.

¹ Kemper (1992) and Bonsang (2009) actually find that informal caregiving substitutes the formal.

² Informal caregiving is provided mainly by children to parents and vice versa. In other words, close relatives provide the most caregiving (Kemper, 1992).

We use a representative sample drawn from the SHARE (Survey of Health, Ageing and Retirement in Europe) survey. Specifically, we use data from Waves 1 and 2 which were collected by personal interviews in 2004 and between the end of 2006 and the summer of 2007 respectively. Caregivers are defined as those women between the ages of 50 and 65 who are currently providing some assistance to a parent or parent-in-law in need (Robin et al., 2007; Rubin and White-Means, 2009). We investigate the effects of informal care on an indicator of self-assessed health commonly used in empirical research (Idler and Kasl, 1995; Idler and Benyamini, 1997; Kennedy et al., 1998; Contoyannis and Jones, 2004; Balia and Jones, 2008) and on a functional indicator of QoL, the CASP-12 which assumes that QoL refers to four conceptual domains of individual needs that are particularly relevant in later life: control (C), autonomy (A), self-realization (S), and pleasure (P). In order to account for individual heterogeneity we match each informal caregiver with a person who does not provide care to elderly parents on each characteristic known to be associated with a caregivers' condition and their well-being outcome (health and QoL) (Caliendo and Kopeinig, 2008). We perform this matching using the Propensity Score (PS), as formalized by Rosenbaum and Rubin (1983). Self-assessed health and QoL of matched individuals are then compared to estimate the average effect of providing informal care.

This analysis provides evidence on the health and QoL consequences caused by the burden of care provided. In addition, our study sheds light on the cultural factors associated with the North-South gradient in Europe which may influence the impact of caregiving on the caregivers' quality of life and health. Indeed, in spite of the changing gender attitudes and the rapid entry of women into the labour force over the past decades, women continue to play a major role in running the household and giving care to family members. Moreover, the extant literature shows that the traditional roles of the woman are still present in many European societies, especially in the Mediterranean area.

2. Informal care, health and quality of life

Providing assistance to older parents is a source not only of stress (especially if also caring for dependent children³) but also of unhappiness, since the decline of parents' health may have a negative effect on the caregiver. In particular, the literature has generally found a relevant gender bias in informal caregiving: women (and daughters in particular) are likely to care for elderly relatives (parents) more than men. In addition the type of support seems to be gender-dependent: males are more likely than females to give their parents financial support, while the latter provide more physical and emotional support than the former (Crisholm, 1999).

In most Western societies, the provision of care to parents and children is culturally considered a responsibility more of women than men (Abel, 1986). Empirical studies show that the traditional division of roles is often confirmed: Stenberg-Nichols and Junk (1997) observe that women are more likely than men to anticipate helping an ageing parent. Keene and Prokos (2007) observe that "sandwiched" women (people who care for their older parents and for children who still live at home) tend to be more involved (i.e. spend more hours) in caregiving than "sandwiched" men in the U.S.A. although the difference is small. Couch et al. (1999) observe that informal caregivers generally transfer time and money to the recipients with men doing so significantly more than women, and that time and money tend to be partial substitutes. However, trading off money for time increases stress and familial conflicts, and this is, not surprisingly, even more pronounced for medium- and low-income households (Crisholm, 1999)⁴. Stenberg-Nichols and Junk (1997) and Voydanoff and Donnelly (1999) show that female caregivers' depression increases with the time spent in assisting old parents. Hammer and Neal (2008) confirm this finding with the prevalence of depression among women rather than among men⁵, although in their sample women provide more hours of care to parents than men. An additional result of their research is that the negative experience of caregiving is partially compensated by positive effects. Malach-Pines et al. (2009) find that the psychological distress of caregivers impacts negatively on job satisfaction, increasing the sense of psychological distress of people; however the intensity of the phenomenon depends also on the country-specific work culture. Rubin and White-Means (2009), using US data, find a negative impact of caregiving on the QoL of those who provide assistance. Although some studies do not present any gender analysis, the fact that most informal caregivers are women entails that they are more affected than men by the negative effects of the care provided.

Walker et al. (1995) find that daughters obtain more satisfaction than sons from caring for elderly parents. In line with these results Couch et al. (1999) show that as time spent providing care increases, women's time dedicated to leisure remains unchanged. Consistently with this, Ingersoll-Dayton et al. (2001) suggest that, in general, women are found to get less stressed and depressed than men when providing care to both parents and children. In Gallicchio et al. (2002), women reported higher subjective stress than men, but the authors did not find any gender difference in the levels of depression. Marks et al. (2002) assess that "evidence regarding gender differences was inconsistent, varying across caregiving role relationship types" (pg. 657). Grundy and Henretta (2006) find that women are more involved in caregiving than men, independent of their level of education, income, social class, age and other family characteristics. Although the evidence is inconclusive, it clearly supports the relevance of our focus on female informal caregivers.

³ A stream of literature focuses on the so-called "sandwich generation" (people who care for their older parents and for children who still live at home). However the effects for the sandwiched are qualitatively the same as for the non-sandwiched.

⁴ Although this is not always true (Deeken et al., 2003): in a few cases the income effect is not significant.

⁵ However the levels of depression are of concern for both genders, as the authors themselves highlight.

Several of the studies summarised so far focus on the consequences of providing care on employment. Indeed, the psychological distress of caregivers may be due to higher rates of having to leave work (Couch et al., 1999; Henz, 2006) or of non-participation in the labour market (Pagani and Marenzi, 2008). According to Rubin and White-Means (2009) caregivers' employment mitigates the negative effects of assisting elderly parents. Hence, working can be a source of satisfaction as affirmation of one's independence and social status. It is then also possible that work serves as a distraction from the burden of care. Keene and Prokos (2007) find that "sandwiched" caregivers would prefer to work more hours than they actually do, as they are "more likely to be content with their work hours relative to non-caregivers" (pg. 380). This result may corroborate both the distraction and the affirmation hypotheses; however it is also possible that the caregivers work more to offset the financial costs of providing care for the elderly.

Informal caregiving is not, however, a negative experience in absolute terms. Walker et al. (1995) highlight that children taking care of elderly parents in need often feel high psychological satisfaction for the support given. Ward and Spitze (1998) find that, while caregiving is a source of psychological distress, it has a positive impact on marital happiness. Stephens et al. (1994) and Ingersoll-Dayton et al. (2001) confirm the previous results in terms of stress, but also find that caregivers receive emotional (Pyke and Bengtson, 1996) and, occasionally, financial help from their elderly parents who are being assisted. However, in their study the net result of the two effects is not assessed.

Differences in the impact of caregiving on individual QoL are likely to depend on the cultural environment. For example, Álvarez and Miles-Touya (2012) find that the Spanish are the least likely population, within the developed countries, to show egalitarian attitudes towards women. And thus they interpret the fact that Spanish women are more likely than men to undertake caregiving tasks as a consequence of the cultural environment, which assigns the role of assistance to elderly parents, to women rather than men. In general, studies that focus on Europe show that familial relations are typically closer in Mediterranean than in Nordic countries (Hank, 2007; Bolin et al., 2008), as well as in the South compared to the North of a Mediterranean country such as Italy (Pagani and Marenzi, 2008). This geographical pattern manifests itself in the fact that in Southern Europe, the responsibility for providing care lies mostly with the family (Brandt et al., 2009; Oudijk et al., 2011). However another reason for this may be related to the fact that Mediterranean systems also involve more time and place constraints for caring at home than Nordic systems, which may engender a shift in care responsibilities onto the families of the beneficiaries of formal care (Le Bihan and Martin, 2006). Therefore, on the one hand, people in Southern Europe should get more satisfaction than the Nordics from providing care to relatives (as they comply with the predominant social model), while on the other hand the burden on Southern Europe is likely to be higher than on the Nordics because there is less formal care (with a consequent greater stress).

The evidence about how caregiving impacts on the QoL and health of caregivers is therefore mixed. On the one hand, there is full agreement that the burden of caring is stressful and involves strain on the psychological and physical health of caregivers. On the other hand, people also value the experience positively in terms of the satisfaction gained from providing care to close relatives in need. The net effect seems to be negative, although the evidence is not clear-cut. Two major results of the research on the issue are that the reaction of the caregiver to the burden depends on cultural factors (mainly on the strength and the social value of family ties) and that positive and negative effects interact producing a net balance, whose sign depends on cultural and structural (i.e the provision of formal care) factors.

3. Data and variables

The individual-level data employed in this study are drawn from the first two waves of SHARE (Survey of Health, Ageing and Retirement in Europe), the first in 2004, the second between the end of 2006 and the summer of 2007. Amongst the studies carried out in Europe about ageing, the most ample and complete is without doubt the SHARE project co-ordinated by the Mannheim Research Institute for the Economics of Aging (MEA). SHARE is the first European database containing information on health status, socio-economic characteristics and family relationships of the over fifties in Europe. It is a multi-disciplinary database organised in such a way as to satisfy at least three areas of research: economic, health and sociological. It is moreover a cross-national database (the questionnaires must be comparable between the nations that have participated in the project) and longitudinal (each question must be constructed in such a way that the information collected can then be used in a panel over a longer term). The design is based on the Health and Retirement Study (HRS) and the English Longitudinal Study of Ageing (ELSA)⁶.

The survey used a computer assisted personal face to face interview (CAPI) and a self administered questionnaire on paper. The target population of SHARE is defined both in terms of households and in terms of individuals. The interviewers observed the family with at least one person, and the individual, born before 1954 who speaks the official language of the country and who during the time of the survey does not live abroad or in an institution like a prison, as well as their spouse/partner independent of age.

The interviews were carried out in 11 European countries in 2004 and in 14 in 2006/07. In 2004 the countries belonged to 3 macro areas: Northern Europe (Denmark and Sweden), Continental Europe (Austria, France, Germany, Switzerland, Belgium and The Netherlands), and the Southern Mediterranean countries (Spain, Greece and Italy). Israel and two Eastern European countries were added in 2006/07 (Poland and the Czech Republic). We do not include these three countries which joined SHARE in 2006/07.

Our analysis is based on release 2.5.0 of Waves 1 and 2 of the SHARE study. We excluded from the sample permanently sick or disabled daughters (0.6% of the sample). We also excluded from the sample all women who were not born in the same country in which they live (0.1% of the sample). For the 2nd wave, after deleting records with missing values, we obtained a final sample of 1825 women (480 belonging to Northern Europe, 635 to Continental Europe and 710 to Southern Europe).

The target population of this study is women between the ages of 50 and 65 with at least one living parent at the time of interview. Women in this age range are most likely to be involved in the care of their elderly parents (Crespo and Mira, 2010). Following Rubin and White-Means (2009), we defined caregivers as women who are currently providing some assistance or care to a parent or parent-in-law, which we call informal care.

SHARE provides respondents with the option of evaluating parents' health: the interviewee was asked to rate her parents' health on a five-point scale, ranging from very good to very bad. In order to select carers, we use health of the elderly parents to proxy for need: we construct a binary indicator with value one if a parent suffered from bad or very bad health. To avoid attrition bias, we construct an indicator variable taking the value one if the mother or father, still alive during the first wave, was dead during the second wave. Following Bolin et al. (2008) in the case of a deceased

⁶ See Börsch-Supan et al. (2008).

parent in the second wave, we assign the parental health indicator a value of one (Bolin et al, 2008)⁷. Then, we select in our sample only women with parents who suffer from bad health.

We also use a threshold in the general definition of informal care. SHARE provides the possibility of distinguishing between women who have provided care to elderly parents living in the household (1.2% of the sample) and women who have provided care outside the household in the past twelve months. Women that provided care to someone living outside the household also reported information about the frequency of this care: almost daily, almost every week, almost every month, less often. In order to get closer to a definition of informal care in contrast to occasional help, we selected personal help being provided on an almost weekly or almost daily basis. For those that reported to have provided care to an elderly parent living in the same household, it has to be daily because a daily filter is included in the opening question.

Given the information provided by SHARE we draw three different samples each belonging to a European macro region: Northern (Denmark, Sweden, and the Netherlands), Continental (Austria, France, Germany, Switzerland, Belgium) and Southern Europe (Spain, Greece and Italy). We group countries according to the generosity of public expenditure for formal long-term care (LTC). Based on OECD data on LTC expenditure as a share of GDP (see Figure 2) we grouped together Spain (which presents one of the lowest levels of LTC expenditure among OECD countries) and the other Southern European countries (Italy and Greece) where overall long-term care provision is mainly based on family resources to a greater extent than in other OECD countries. At the other extreme, Scandinavian countries group together with the Netherlands. We included the Netherlands among the Northern countries since both total and public expenditure on LTC are substantial higher than any other Continental country. In between, France and Belgium are closer to the former, and Germany, Austria, and Switzerland are closer to the latter.

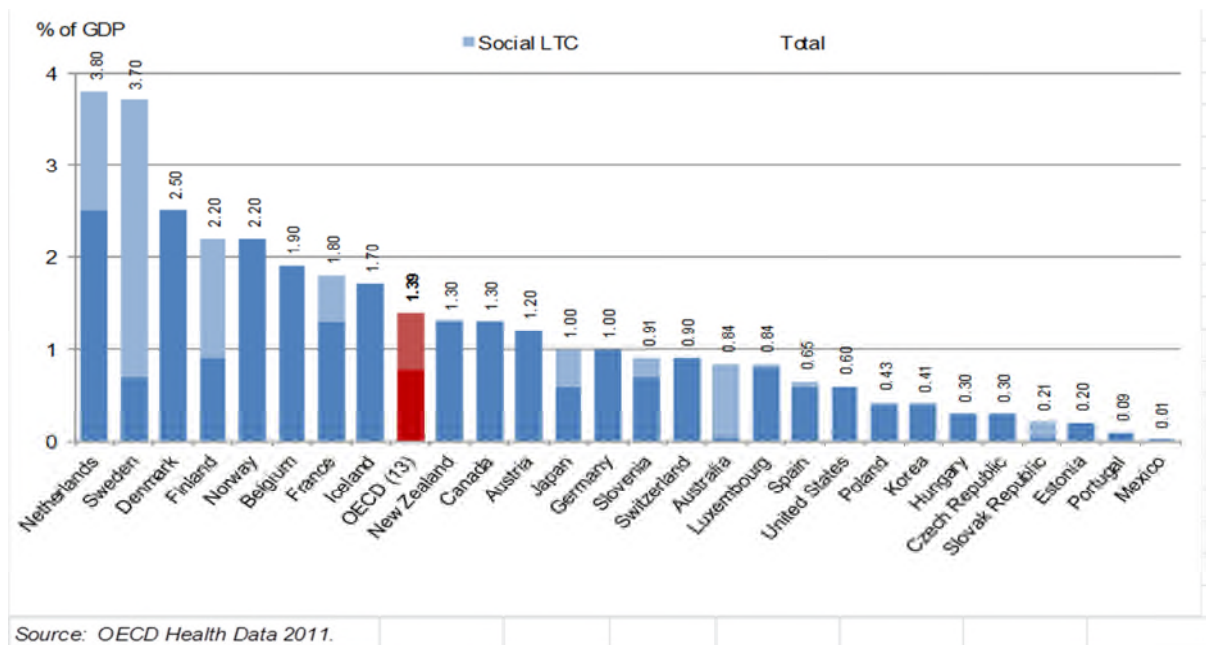


Figure 2 Long-term care public expenditure (health and social components), as share of GDP, 2009 (or nearest year)

⁷ As with most panel surveys, SHARE has some drawbacks. It is subject to attrition bias, as respondents gradually drop out of the panel.

3.1 Health and Quality of Life Variables

As an indicator for health we use self-assessed health (SAH) for the respondents in SHARE. SAH has been widely used in previous studies examining the relationship between health, socioeconomic status and life-styles (e.g. Kenkel, 1994; Contoyannis and Jones, 2004; Balia and Jones, 2008). SAH is supported by a literature that shows the strong predictive relationship between people's self rating of their health and mortality or 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). The following standard question was asked: "Would you say that in general your health is: excellent, very good, good, fair, poor". The answers cannot simply be scored as a categorical discrete variable, because the true scale will not be equidistant between categories (O'Donnell et al., 2008). One of the most used methods of scaling SAH available in the literature (Browne and Doeringhaus, 1993; Piko and Keresztes, 2007; Contoyannis and Jones, 2004; Balia and Jones, 2008) is dichotomizing the multiple-category responses and constructing a binary indicator with value one if individuals reported that their health was excellent, very good or good, and zero otherwise (fair or poor). This practice helps avoid the imposition of some scale (Wagstaff and van Doorslaer, 1994). Thus, we have dichotomized the SAH into a healthy/non-healthy binary variable⁸.

One of the innovations of SHARE is the inclusion of a wide battery of measurements of well-being; some of them have been particularly developed for the early old age. Among these we consider a functional indicator of QoL, the CASP-12. The CASP-12 questionnaire represents a psychometrically validated short version of the original 19-item version (CASP-19) (Hyde et al., 2003). It is a self-reported index built on a 12 item questionnaire organized in four-point Likert ascending scales. CASP-12 captures four dimensions of QoL: control (C), autonomy (A), self-realisation (S) and pleasure (P). The first letter of each domain and its 12 items create the acronym CASP-12. It provides an easily interpretable score ranging from 12 to 48, with higher scores indicating better QoL.

⁸ We carried out a sensitivity analysis re-running the model with a different cut-off point for SAH: we constructed a binary indicator that took value one for women who reported that their health was excellent or very good and zero otherwise (good, fair, poor). This construction did not significantly affect the results. For the sake of brevity, the results of the sensitivity analysis are not included but they are available on request.

4. Methodology

Identifying a causal association between informal care and informal caregivers' health and QoL may be complicated by the presence of endogeneity due to self-selection and potential reverse causality in the relationship between the provision of informal care and informal caregivers' health and QoL. Panel data are useful to disentangle the problem of reverse causality but the selection problem still remains difficult to resolve. The treatment assignments may not be randomized and outcomes may be biased by differences in the characteristics which influence the selection into informal care. One method of adjusting an analysis of treatment outcomes for the effects of confounding covariates is to perform Propensity Score (PS) matching, as formalized by Rosenbaum and Rubin (1983).

Analytically, this method calculates an index $e(X)$ for each individual, as a function of confounders (X) and represents the conditional probability of being an informal caregiver, given all observable individual characteristics:

$$e(X) = P(I = 1 | X) \quad (1)$$

where $I=1$ denotes that the individual belongs to the informal caregivers group (or the "exposed" group). The PS can be considered as a balancing score, meaning that among subjects with the same propensity to be exposed, treatment is conditionally independent of the covariates.

The matching is carried out through algorithms which form "statistical twins" that differ only in their "informal care giving" status and not in other observed characteristics in order to account for self-selection. Since the sample consists of comparatively few informal caregivers in relation to many untreated ones, Kernel and Radius (with caliper 0.5) matching were chosen as the matching algorithms. These techniques use the maximum amount of data and, in the case of Radius matching, the imposition of a tolerance threshold avoids the risk of bad matches (Caliendo and Kopeinig, 2008; Imbens and Wooldridge, 2009).

Finally, the QoL and SAH of matched individuals are then compared to estimate the average effect of being an informal caregiver. Specifically, we are interested in the average effect of the treatment on the treated (ATT) i.e. in the difference between SAH and the QoL outcomes for women who provide informal care with respect to the counterfactual unobservable outcome which would have prevailed for those who do not provide care to elderly parents. The estimation was carried out using the PSMATCH2 program for STATA developed by Leuven and Sianesi (2003).

We compute the propensity score through a probit model. The dependent variable is a dummy indicator that is equal to zero if the respondent does not provide care to elderly parents and one if she provides care; controls which could be associated with both QoL, self assessed health and informal care giver conditions include age, living area, presence of children in the household, grandchildren, siblings, parental death, marital status, job characteristics, education, household income, and country dummies. We also include in the probit model, among the controls, a measure of QoL and SAH and informal care giver status from the first wave.

In order to obtain precise propensity score estimates, we run two probit models for each macro-area (North, Continental and South Europe) with the SAH and the CASP included individually:

$$\begin{aligned} \text{Probit}(p) = & \beta_0 + \beta_1 \text{age} + \beta_2 \text{parental death} + \beta_3 \text{rural} + \beta_4 \text{years of education} + \beta_5 \text{children} + \\ & + \beta_6 \text{grandchildren} + \beta_7 \text{siblings} + \beta_8 \text{single} + \beta_9 \text{employed} + \beta_{10} \text{income} + \beta_{11} \text{SAH at the 1st wave} + \\ & + \beta_{12} \text{caregiver at the 1st wave} + \beta_{13..n} \text{country dummies} \end{aligned} \quad (2)$$

$$\begin{aligned} \text{Probit}(p) = & \beta_0 + \beta_1 \text{age} + \beta_2 \text{parental death} + \beta_3 \text{rural} + \beta_4 \text{years of education} + \beta_5 \text{children} + \\ & + \beta_6 \text{grandchildren} + \beta_7 \text{siblings} + \beta_8 \text{single} + \beta_9 \text{employed} + \beta_{10} \text{income} + \beta_{11} \text{CASP at the 1st wave} + \\ & + \beta_{12} \text{caregiver at the 1st wave} + \beta_{13, \dots, n} \text{country dummies} \end{aligned} \quad (3)$$

In each probit model the reference individual lives with a spouse or a partner and has no children living at home and has no grandchildren. She is a homemaker or retired or unemployed. The reference country is The Netherlands for the North, France for Continental Europe and Greece for the South. The matched individuals for each probit model and for each macro area are then compared to estimate, respectively, the ATT on the SAH and CASP outcome at the second wave.

In the probit model age is modelled as a continuous variable. We include 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. Moreover, country dummies are included to capture some of the unobserved factors at the country level.

Marital status was categorized into living with a spouse or a partner in the same household and living as single. We also include variables reflecting other family responsibilities: we create a binary variable with value one if respondents reported that at least one child lives in the household and a binary variable with value one if the respondent has any grandchildren. Moreover, we also include among the controls other potential sources of informal care for elderly parents other than husband or partner: the number of siblings (brothers and sisters) the respondent has⁹.

Income information is based on the total annual household income, obtained summing up its different components assessed in the questionnaire. Income was normalized on the family size and log-transformed to obtain a normal distribution. It was modeled as a continuous variable¹⁰. The education indicator is based on the respondent's years of education derived from the ISCED-97 coding. Occupations were categorized into two groups: employed, and not employed (retired, homemaker and unemployed)¹¹.

The variable on the informal caregiver's health condition in the first wave was also included in the model as a measure of past health status. We include among the controls, dummies for individual's SAH (a dummy variable with value one if individuals reported that their health was excellent, very good or good, and zero otherwise) and CASP at the first wave. Concerning the CASP indicator we created a binary variable that takes the value one if participants exhibited high QoL i.e. if they did not score in the lowest tertile. We also created a binary indicator that takes the value one if respondents reported that they provided care to a parent or parent-in-law in the first wave. A definition of all variables used in our analysis is listed in Table 1.

Table 2 presents summary statistics for all the demographic and socio-economic factors in the final sample. Table 2 shows that being slightly older (except for the South), having better SAH at 1st wave (except for the North), and a higher CASP, are characteristics associated with providing informal care.

⁹ The sibling caregiving and siblings' opportunities to care are likely to influence the caregiving of an individual daughter (Coe and Van Houtven, 2009).

¹⁰ Income is converted into Euros. For non-Euro countries a frozen exchange rate is chosen from the SHARE database.

¹¹ We did test disaggregating these variables but did not obtain a balanced sample.

Table 3 shows descriptive statistics for the SAH and CASP indicators across the three macro-regions. There is a clear North-South gradient in the CASP average values at the second wave which range from 33.33 in Southern Europe to 38.04 in Northern Europe for the full sample. Average values for the South are lower in every dimension of the index than for other regions. There is also a clear gradient in the SAH at the second wave indicator: 83.3% of women in the North reported during the interview that they perceived good health against 71.8 % in the South. Self-reported QoL and health status are higher among women who provide care to elderly parents.

Table 1: Definition of variables

Variable name	Variable definition
<i>Outcome variables</i>	
SAH at the 2nd wave	self-assessed health
CASP-12 at the 2nd wave	functional indicator of quality of life
<i>Controls</i>	
age	age in years
parental death	1 if at least a parent was dead, 0 otherwise
rural	1 if lives in a rural area or a village, 0 otherwise
<i>Education</i>	
years of education	respondents years of education
<i>Family composition and marital status</i>	
children at home	1 if at least one child lives at home, 0 otherwise
grandchildren	1 if has grandchildren, 0 otherwise
siblings	number of siblings
single	1 if single, 0 otherwise
living with spouse or partner	1 if live with a spouse or a partner, 0 otherwise
<i>Occupation and income</i>	
not employed	1 if retired, homemaker or unemployed, 0 otherwise
employed	1 if employed, 0 otherwise
income	annual family income (in euros)
<i>SAH and Quality of Life at the first wave</i>	
SAH first wave	self-assessed health at the first wave
CASP-12 at the first wave	functional indicator of quality of life at the first wave
<i>Informal caregivers condition</i>	
informal caregiver at the first wave	1 if provided care at the first wave, 0 otherwise

Table 2: Descriptive statistics of variables in the propensity score model

Variable	Full sample		No informal care		Informal care	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
a) North						
age	57.385	3.777	57.000	3.802	58.156	3.618
rural area	0.188	0.391	0.172	0.378	0.219	0.415
parental death	0.427	0.495	0.422	0.495	0.438	0.498
children at home	0.156	0.363	0.219	0.414	0.031	0.175
grandchildren	0.260	0.439	0.203	0.403	0.375	0.486
siblings	2.260	1.558	2.297	1.368	2.188	1.884
single	0.188	0.391	0.234	0.424	0.094	0.292
living with spouse or partner	0.813	0.391	0.766	0.424	0.906	0.292
employed	0.729	0.445	0.734	0.442	0.719	0.451
years of education	12.516	3.507	12.859	3.185	11.828	3.998
income	43604.470	29022.320	40093.350	22119.760	50626.730	38488.980
SAH at the first wave	0.875	0.331	0.906	0.292	0.813	0.392
CASP at first wave	0.333	0.472	0.109	0.313	0.781	0.415
Informal care at first wave	0.917	0.277	0.906	0.292	0.938	0.243
Netherlands	0.177	0.382	0.125	0.331	0.281	0.451
Denmark	0.323	0.468	0.313	0.464	0.344	0.476
Sweden	0.500	0.501	0.563	0.497	0.375	0.486
N	480		320		160	
b) Continental						
age	56.921	3.554	56.430	3.527	57.951	3.394
rural area	0.276	0.447	0.314	0.465	0.195	0.397
parental death	0.339	0.474	0.291	0.455	0.439	0.497
children at home	0.220	0.415	0.221	0.415	0.220	0.415
grandchildren	0.299	0.458	0.337	0.473	0.220	0.415
siblings	2.016	2.021	2.360	2.132	1.293	1.538
single	0.118	0.323	0.081	0.274	0.195	0.397
living with spouse or partner	0.882	0.323	0.919	0.274	0.805	0.397
employed	0.449	0.498	0.430	0.496	0.488	0.501
years of education	11.150	3.774	11.116	3.849	11.220	3.621
income	41901.570	36681.880	44904.910	36415.030	35601.890	36527.820
SAH at the first wave	0.819	0.385	0.802	0.399	0.854	0.354
CASP at first wave	0.323	0.468	0.698	0.460	0.829	0.377
Informal care at first wave	0.740	0.439	0.128	0.334	0.732	0.444
Austria	0.236	0.425	0.267	0.443	0.171	0.377
Belgium	0.339	0.474	0.279	0.449	0.463	0.500
France	0.063	0.243	0.070	0.255	0.049	0.216
Germany	0.220	0.415	0.233	0.423	0.195	0.397
Switzerland	0.142	0.349	0.151	0.359	0.122	0.328
N	635		430		205	

Variable	Full Sample		No Informal Care		Informal Care	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
c) South						
age	56.803	4.005	56.935	4.145	56.382	3.500
rural area	0.162	0.369	0.148	0.356	0.206	0.406
parental death	0.366	0.482	0.370	0.483	0.353	0.479
children at home	0.430	0.495	0.398	0.490	0.529	0.501
grandchildren	0.190	0.393	0.194	0.396	0.176	0.382
siblings	2.479	2.063	2.417	1.951	2.676	2.380
single	0.162	0.369	0.148	0.356	0.206	0.406
living with spouse or partner	0.838	0.369	0.852	0.356	0.794	0.406
employed	0.261	0.439	0.269	0.444	0.235	0.425
years of education	9.120	4.082	8.796	3.772	10.147	4.811
income	22555.130	24905.530	23044.780	27654.880	20999.790	12644.090
SAH at the first wave	0.789	0.408	0.778	0.416	0.824	0.382
CASP at first wave	0.218	0.413	0.120	0.326	0.529	0.501
Informal care at first wave	0.521	0.500	0.519	0.500	0.529	0.501
Greece	0.435	0.499	0.583	0.493	0.382	0.487
Italy	0.283	0.387	0.148	0.356	0.294	0.457
Spain	0.282	0.450	0.269	0.444	0.324	0.469
N	710		540		170	

Table 3: Descriptive statistics SAH and CASP

	North		Continental		South	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Full sample						
CASP	38.042	3.871	37.094	4.432	33.331	4.601
Control	9.302	1.635	9.331	2.083	8.261	1.854
Autonomy	7.198	1.391	7.252	1.794	6.423	1.471
Self Realization	10.948	1.624	10.575	1.761	9.838	1.583
Pleasure	10.594	1.519	9.937	1.957	8.810	1.729
SAH	0.833	0.373	0.772	0.420	0.718	0.450
No informal care						
CASP	37.828	4.196	37.116	4.639	33.102	4.800
Control	9.297	1.695	9.442	1.905	8.204	1.780
Autonomy	7.156	1.397	7.651	1.719	6.426	1.493
Self Realization	10.859	1.562	10.302	1.950	9.750	1.652
Pleasure	10.516	1.574	9.721	2.086	8.722	1.770
SAH	0.781	0.414	0.721	0.449	0.713	0.453
Informal care						
CASP	38.469	3.092	37.049	3.973	34.059	3.823
Control	9.313	1.514	9.098	2.403	8.441	2.067
Autonomy	7.281	1.379	6.415	1.656	6.412	1.400
Self Realization	11.125	1.733	11.146	1.075	10.118	1.305
Pleasure	10.750	1.396	10.390	1.564	9.088	1.565
SAH	0.938	0.243	0.878	0.328	0.735	0.442

5. Results

Table 4 presents the results for the average effect of the treatment on the treated (ATT) computed using kernel and radius (with caliper 0.5) matching¹². Only observations within the common support are used in the matching. The common support restriction is implemented by deleting treatment observations whose propensity score is higher than the maximum or lower than the minimum propensity score of the matched controls. The covariates (not included in the table but available on request) for the propensity score estimation computed for each European region showed that the provision of informal care is positively related to being younger, living with a spouse or a partner and showing a good health status at the first wave.

Table 4: Average treatment effect (ATT) of propensity score matching^a

North				
	Kernel Matching		Radius Matching	
	ATT	S.E.	ATT	S.E.
CASP	0.133	0.578	0.397	0.593
control	0.299	0.271	0.388	0.277
autonomy	0.185	0.266	0.122	0.270
self_real	-0.177	0.357	-0.012	0.362
pleasure	-0.174	0.235	-0.102	0.243
SAH	0.427***	0.053	0.379***	0.046
Continental				
	Kernel Matching		Radius Matching	
	ATT	S.E.	ATT	S.E.
CASP	-1.456**	0.590	-1.377**	0.591
control	-0.903***	0.287	-0.856***	0.288
autonomy	-1.743***	0.229	-1.723***	0.230
self_real	0.554**	0.217	0.592**	0.217
pleasure	0.635**	0.259	0.609**	0.260
SAH	0.128**	0.054	0.138**	0.054
South				
	Kernel Matching		Radius Matching	
	ATT	S.E.	ATT	S.E.
CASP	0.613	0.470	0.588	0.477
control	-0.228	0.211	-0.245	0.213
autonomy	-0.133	0.162	-0.114	0.165
self_real	0.567***	0.163	0.540***	0.165
pleasure	0.407**	0.176	0.407**	0.177
SAH	0.075	0.050	0.077	0.050

^aThe ATT 's are obtained using the Epanechnikov Kernel and Radius (with caliper 0.05) matching techniques. Analytical standard errors are reported.

¹²Sensitivity analysis was carried out on radius caliper size (0.05 to 0.10) which found that the results were not highly sensitive to caliper size.

Covariate balancing tests, reported in Table 5, show that the matching is effective in removing differences in observable characteristics between formal caregivers and daughters who do not provide care to elderly parents. In particular, the median absolute bias is reduced by approximately 40%-62% depending on the macro area and the matching technique. The Pseudo R-squared after matching is always close to zero, correctly suggesting that the covariates have no explanatory power in the matched samples.

Table 5: Results of covariate balancing tests

	Pseudo R2	LR chi2	p>chi2	Median Bias	% reduction Median Bias
North					
<i>Kernel</i>					
Before Matching	0.535	327.05	0	26.2	0.622
After Matching	0.052	9.3	0.9	9.9	
<i>Radius</i>					
Before Matching	0.535	327.05	0	26.2	0.615
After Matching	0.057	10.22	0.855	10.1	
Continental					
<i>Kernel</i>					
Before Matching	0.402	320.75	0	32.9	0.641
After Matching	0.057	23.88	0.159	11.8	
<i>Radius</i>					
Before Matching	0.402	320.75	0	32.9	0.653
After Matching	0.059	24.53	0.138	11.4	
South					
<i>Kernel</i>					
Before Matching	0.245	191.16	0	15.1	0.404
After Matching	0.04	17.69	0.279	9	
<i>Radius</i>					
Before Matching	0.245	191.16	0	15.1	0.523
After Matching	0.045	20.12	0.167	7.2	

We have tried a different specification of the propensity score model to check to what extent our ATTs are sensitive to the observable variables chosen. For instance, it might be argued that employment status may not be a good pre-treatment variable since it may be determined, in turn, by the informal caregiver status. In our main model, we include employment status since it is not only a good proxy of the opportunity cost of care (which may influence the probability of being a caregiver) but is also a source of satisfaction as affirmation of one's independence and social status. As anticipated, it is then also possible that work serves as a distraction from the burden of assistance and hence may positively influence women's health status and QoL. Our results are not driven by the inclusion of this variable because when excluding employment status from the probit model, the ATTs remain substantially unchanged.

We start by considering the SAH ATT. Table 4 shows that it decreases moving South. Actually, in Northern Europe the ATT is around 0.4 and highly significant, in the continental countries the ATT decreases to values of around 0.13, while it is not statistically different from 0 in Southern Europe. These figures mean that a North-European caregiver has a 40% higher probability than a non-caregiver of assessing her own health as good, while in the Mediterranean area there is statistically no difference between the SAH of caregivers and non-caregivers.

At first sight this result may seem puzzling, since one may expect that providing care to elderly parents is detrimental to health. However, there are at least three explanations for our outcome. The first relates to why we expected the North-South gradient to have an effect: moving South, the national welfare state systems provide less and less formal care to the elderly (see Figure 2), as traditionally this is a duty of the younger members of the household. In other words, as we move South, the burden of care is more often charged to daughters whose health gets negatively affected. In this case then, the cause of the observed outcome is exogenous. Furthermore, theory suggests that people with more negative ageing stereotypes (and sick parents are likely to be) invest more in their health than others (Macé and Le Lec, 2011).

The second explanation involves the psychological literature on reference points: women who provide care to elderly parents everyday are in contact with people whose health is bad (at least, the health of the assisted is worse than that of the caregivers). As a consequence, when asked to rate their health using an ordinal verbal scale, the caregivers, who feel comparatively much better than their assisted, would tend to be more positive than the non-caregivers. This does not mean that the former have better health than the latter from a clinical point of view, simply that their reference point renders them feeling better off. Furthermore, people who feel better also have a better QoL (Zack et al., 2004 and Dolan et al., 2008).

The third explanation relies upon the emotional complexity of the phenomenon of informal caregiving. As we have highlighted in previous sections, daughters who provide care to their elderly parents in need experience several emotions, some of which are negative, whilst some are positive.

The results of the analysis of the CASP show the emotional and the cultural complexity of informal caregiving. The figures presented in Table 4 show not only the existence of a North-South gradient, but also reveal that the effect of caregiving on one's QoL is multifaceted and affects the four components of the CASP differently.

Considering the synthetic CASP, we notice that the ATT is significant only for the Continental Europe sub-sample, and that it is negative. This means that informal caregivers have a worse CASP than people who do not provide any care. A deeper investigation into the components of the CASP shows very interesting results and unveils part of the complexity of the phenomenon.

First of all, female caregivers in both Continental and Mediterranean Europe feel more self-realised and derive more pleasure in their lives than non-caregivers. This result can have different explanations. It would indeed seem consistent with social norms: helping parents and relatives in need is generally considered a moral duty in all Western societies; and breaking a social norm is usually punished with social stigma. Furthermore, a large strand of literature on social norms (Elster, 1989; Andreoni and Vesterlund, 2001; Torgler and Valev, 2006; Torgler and Valev, 2010; Chiang and Assane, 2007; Chiang and Assane, 2008) shows that women are particularly likely to feel the bond of social norms, and that this feeling is stronger in Southern countries than in Northern ones. In particular, the positive effect of caregiving on the sense of self-realisation seems to be consistent with this interpretation: fulfilling social norms and expectations can lead to a strong sense of self-realisation, as one feels compelled to comply with what is generally considered "good". In this respect therefore, one's investment in caregiving is rewarded by an increase in individual QoL.

In addition to the explanation around social norms, the sense of pleasure may derive from factors that are more subjective (i.e. more related to one's life, one's ethics and to the relationships one has had with relatives during life), such as satisfaction from reciprocity whereby parents care for young children, and these, once adult, reciprocate (Nowak and Sigmund, 2005) and from helping a loved one, being able to show love to him/her (Andrén and Elmståhl, 2005). Finally, Binder and Freytag

(2013) highlight that regular volunteering in pro-social activities (of which informal caregiving is considered a type) has a positive impact on individual well-being.

Caregivers from Continental Europe feel less able to control their life and less autonomous than non-caregivers (the same signs hold for Southern Europe, but the ATT is not statistically significant). This is not unexpected: providing care is time consuming, and this reduces the caregiver's autonomy. What is interesting is that the effect is significant only in Continental Europe. A possible interpretation is that this outcome is the result of the combination of two factors. On the one hand, there is the geographic difference in terms of provision of formal caregiving. On the other hand, providing care for relatives reduces time to work and therefore generally has a negative impact on salaries and careers. Although several studies reveal that women are less career-oriented and less money-driven than men (Gjerberg, 2002; Joy, 2006; Castillo and Cross, 2008; Croson and Gneezy, 2009), independent of the geographic area and as long as they live in non-matriarchal societies (Gneezy et al., 2009), Weber (1905;1930) and Tawney (1926) recall that in the Calvinist and Lutheran societies (that are mainly concentrated in Continental and Northern Europe) one's success is measured essentially in terms of earnings and careers. Since Northern Europeans can rely more upon formal caregiving than Continental Europeans, the combination of the cultural factors and the differences in the provision of formal care are likely to explain our result that autonomy and control are lower in Continental Europe where caring reduces earnings and career opportunities.

At this point one might argue that there is a contradiction between the ATT on the SAH and on the CASP. Actually this would be too hasty a conclusion. The CASP and the SAH measure two different aspects, the one being more related to physical health and the other to psychological health, and the positive correlation between them does not necessarily entail that caregiving must have the same impact on both. The CASP is a synthetic indicator, that captures different components of one's QoL, and our analysis discloses its complexity. In particular, the components of the CASP that are affected negatively by providing care (control and autonomy) are likely to be less related to physical health and more to psychological health.

6. Discussion

Overall our results show that the provision of caregiving to close relatives in Europe impacts on the providers' QoL in a way that depends on their geographical location (and therefore on the specific cultural/social norms of the area).

In particular, the expected North-South gradient is confirmed for SAH. Caregivers in Northern Europe and the Continent rate their SAH as higher than non-carers while in the South there is no significant difference. The degree of provision of formal care to the elderly, whether as a complement or substitute, is an important influence on the burden of care left to informal carers. The North-South gradient in this formal care provision drives some of the differences in our observed responses to SAH. Along with the emotional complexities of caregiving being both negative and positive, and the psychological reference of viewing their health as better than their elderly parent, carers with more formal support structures rate their health as better than non-carers.

We also observe a North-South gradient for QoL with caregivers in the Continent and South experiencing feelings of more self-realisation and pleasure, but those in the Continent feeling less autonomous and in control. A major result of our work is the decomposition of the CASP into its four components and the investigation of the impact of caregiving on each of them. The analysis shows that the impact of informal caregiving on the four components of the CASP varies significantly across macro regions. On the one hand, our outcomes show that informal caregiving does not result in a straightforward reduction in one's QoL; on the other hand, the separate analysis of the components of the CASP allow us to understand which spheres of one's life are the most affected, how they are affected and the balance between impacts with different signs. All the evidence provided here leads us to conclude that informal caregiving is a complex phenomenon which may bring both psychological rewards and distress to providers of care.

Although this was not totally unexpected, in light of the extant literature, the combination of the geographical gradient and complexity of the phenomenon leads to very novel evidence and suggests the formulation of effective policies for care-giving could be particularly challenging. The results show the importance of ensuring that policies match the needs of individual carers in their own geographical areas and cultural contexts and that policies should be tailored to take account of the social environment of caregiving so as to tip the balance in favour of a positive psychological outcome.

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