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Decomposition of Informal Care Supply Variation across Europe

Master Thesis in Health Economics

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Abstract

Given the growing proportion of the elderly in the populations of Europe that affects organization and funding of long-term care, the availability of informal caregivers becomes increasingly important. It has been established that there exists a great variation across Europe in the proportion of people who provide some kind of informal care. Using comparable data across Europe, we examine the sources of this variation. We found a North – South gradient in the percentage of population providing informal care across Europe for three of the four types of informal care we analyzed. We then decomposed the difference between North and South clusters of countries and found that the differences are not mainly the result of differences in population characteristics but rather derive from differences in the effects of these characteristics that are associated with cultural and institutional differences. The detailed decomposition further reveals where particular policies can be targeted to increase the share of care provided by informal caregivers.

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Introduction

The growing proportion of the elderly in the populations of Europe affects the organisation and funding of many public services including health care and particularly long-term care. (Economic Policy Committee 2001, 2006, 2009, OECD 2005). According to Economic Policy Committee report (2006) the average public spending on long-term care in the EU-25 countries is projected to increase from 0.9% of GDP in 2004 to 1.7% of GDP in 2050 due to population ageing alone. Moreover, if the potential increase in provision of formal long term care is included in the projections, the average public spending on long-term care may increase to 2.3% of GDP in 2050. However, it is acknowledged that informal care is an effective substitute for formal long term care as long as the needs of the elderly are low and require unskilled type of care (Bonsang, 2009, Bolin et al., 2008, Van Houtven and Norton, 2004). Thus increasing informal care might help to slow down the expenditure growth for long term care. Consequentially, informal caregiving and 'productive ageing' have become important topics for both scientists and policymakers (Morrow-Howell et al., 2001).

The concept of productive ageing means that middle aged and older persons are expected to remain active for longer to make a productive contribution to society, whether through paid work, by volunteering or by providing informal care (Sadiraj et al., 2009, Oudijk et al.2011). Given the continuing population ageing, it is important to maintain and increase the number of people providing informal care. Although, most research regards the elderly as the group who consume care, it is acknowledged that they provide help as well. A Dutch study suggested that the percentage of informal carers aged 65 and over will increase from 20% in 2009 to 30% in 2030 (Sadiraj et al., 2009). The increasing proportion of the elderly in the population means there is likely to be growing demand for care, while at the same time older persons might spend more years in good health (Crimmins, 2004) and therefore they increasingly can choose to provide informal care (Oudijk et al., 2011). Moreover, there is growing international recognition of the importance of social participation by middle aged and older persons in Europe, including participation through informal caregiving (EU Council, 2009).

To increase the supply of informal care and participation of the elderly and to utilize the potential of the increased shares of elderly populations, it is necessary to study the determinants of providing informal care among the middle aged and older populations in developed countries. The literature describes several motives that can drive a person to supply informal care. The most frequent is the altruistic motive, which means that the caregiver derives utility from the wellbeing of the dependent person or in other words people care for others out of love and affection. Also, duty and obligation play a significant role (Eurocarers, 2008). Strategic behaviour guided by a bequest motive – the promise of inheritance – has been studied with regard to provision of informal care; but Sloan (1997; 2002) found no evidence of it. However, Norton et

al (2013) found that children, who provide care to their parents, are more likely to receive financial transfers from them than those who do not provide care.

In addition, caregiver's decision about providing informal care depends on her socio-demographic characteristics, the relationship with the dependent person, family income level and the type of disability or illness affecting the dependent person, as well as the availability of other possible sources of care (Picard, 2011). Moreover, the supply of informal care highly depends on the national policies that affect provision of long term care, like availability of formal long-term care and the support to the provision of informal care (Casado-Marin et al., 2010). There exists substantial evidence that there are cultural differences between northern and southern Europe in the provision of informal care (Bolin et al., 2008; Kohli et al., 2005; Lundborg, 2006). These differences are reflected by a North-South gradient in the overall design of the welfare systems of Europe, including the long-term care systems and support of informal care. Also, it is possible that cross-country variation in the provision of informal care may reflect variations in health and disability levels and thus the need for long-term care (Picard, 2011).

This paper further investigates the variation in the provision of informal care in Europe. Variation in informal care supply may exist for two broad types of reasons. First, the distribution of individual determinants of informal care may differ between countries. For example, if education is a very significant determinant of informal care provision and one country has remarkably higher average education level than the other country, the resulting informal care supply levels will be different. Second, the effect of determinants on informal care provision may vary across countries. Important sources of variation in the impact of determinants are policy, institutional and cultural differences among countries.

We analyze the probability of providing four kinds of informal care depending on individual and family characteristics as well as national and regional factors, using the Survey of Health, Ageing and Retirement in Europe (SHARE) that includes individuals aged 50 or over from 14 European countries. We model informal care supply as a function of personal and household characteristics and decompose the difference between different parts of Europe into contributions of differences in population characteristics and of differences in coefficients. The differences in coefficients show that the relationship between population characteristics and provision of informal care differs among countries and may result from institutional and cultural differences.

In brief, we found a North – South gradient in the percentage of population providing informal care across Europe for three of the four types of informal care we analyzed. We then decomposed the difference between North and South clusters of countries and found that the

differences in coefficients account for the greatest part of the gap, thus suggesting that institutional and cultural differences across Europe account for the most part of the differences in informal care supply.

The paper proceeds as follows. First, the data will be presented. Second, the variables and empirical methods used in the paper are described. Third, the results are presented. The paper concludes with a discussion of the implications of our results for research and policy.

Data

We use the data from the second wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) collected in 2006 – 2007. SHARE is a cross-national panel database that contains information about health, socio-economic status and social and family related variables of more than 34,000 individuals aged 50 or over and their spouses, irrespective of age, who live in 14 countries in Europe.

As noted by Riedel and Kraus (2011), by using SHARE data, information regarding informal care can be derived from two starting points, either from respondents who are carers, or from respondents who receive care. The responses of the care receivers, however, do not contain information on the person providing care. We therefore use the information provided by the caregiver.

We select a sample of respondents, who do not have missing values in any of the variables we use for our analysis. The data in total contains 34 415 observations, from which 12 750 drop out due to item non-response, leaving us with a sample size of 21 665. The number of observations per country is summarized in Table 1.

	Sample size		**Percentage of respondents providing informal care**			
Country	*Selected*	*Total*	*Personal care inside household*	*Personal care outside household*	*Household help*	*Help with paperwork*
Austria	577	1341	6.41	4.68	24.96	9.01
Belgium	2038	3169	6.18	7.26	35.97	13.44
Czechia	1766	2830	7.36	6.4	29.11	7.70
Denmark	1720	2616	5.12	8.2	42.21	15.00
France	685	2968	6.42	7.88	19.71	14.01
Germany	1586	2568	6.31	7.19	30.64	11.60
Greece	2147	3243	7.73	6.85	13.09	6.89
Ireland	789	1134	8.11	9.13	28.01	9.89
Italy	2239	2983	8.58	10.85	17.02	10.63
Netherlands	1915	2661	4.23	9.50	36.50	15.04
Poland	1965	2467	9.06	4.22	14.35	4.78
Spain	1569	2228	9.37	6.69	9.75	5.42
Sweden	1763	2745	3.46	6.52	37.27	13.67

Switzerland	906	1462	4.08	6.95	25.06	13.02
Total	*21665*	*34415*	*6.7*	*7.42*	*26.03*	*10.57*

Table 1: Number of observations per country and percentage of the selected sample providing different types of informal care. (Source: SHARE)

Dependent variables

Our outcome of interest is the probability of providing informal care for more than 3 months in the last year either inside or outside the household. Pommer (2007) suggests that the determinants of providing care inside the household differ from those outside of the household. For example, in a family context, the carers inside a household would mostly be the partners/spouses of the dependent person, while the carers outside a household are more likely to be children of the dependent person. Thus we split provision of informal care into care within the household and outside the household.

Furthermore, Brandt et al. (2009) suggest that different types of carers provide different types of informal care. According to them household help and personal care each follow their own mechanisms, not only on the individual and family but also on the societal levels. Whereas care is frequently a necessity, the provision of which is determined by the needs of the heavily dependent recipient, help services are less obligatory and can more easily be performed on a voluntary basis. Therefore it is important to split these types of care when analyzing the determinants.

SHARE splits the care provided outside of household into three parts – personal care, practical household help and help with paperwork. Thus we will use and analyze four different outcome variables:

- personal care within household
- personal care outside the household
- practical household help
- help with paperwork.

We can see the extent of variation in the percentage of people providing these four types of care in Table 1. About 6.7% of our sample provide personal care within household and 7.4% provide personal care outside household. The percentages of respondents providing "help" services are higher. About 26% of the sample provide household help while 10.6% help with paperwork to someone outside their household.

Moreover, countries like The Netherlands, Sweden, Switzerland and Denmark have a low percentage of respondents providing care inside household, while comparatively high percentage provides care outside household. The Netherlands, Sweden and Denmark also enjoy the highest percentage of people providing household help and help with paperwork. In contrast, Greece, Poland and Spain have higher percentage of caregivers who provide personal

care inside household than outside household and they have the lowest percentages of providers of household help and help with paperwork.

Box 1 shows the precise formulations of questions regarding informal care provision from the SHARE survey.

Inside HH: Is there someone living in this household whom you have helped regularly during the last twelve months with personal care, such as washing, getting out of bed, or dressing?
Outside HH: In the last twelve months, have you personally given any kind of help listed on card 28 to a family member from outside the household, a friend or neighbour?

1. *personal care:*
   - *dressing, including putting on shoes and socks*
   - *bathing or showering*
   - *eating, e.g. cutting up your food*
   - *getting in or out of bed*
   - *using the toilet, including getting up or down*
2. *practical household help, e.g. with home repairs, gardening, transportation, shopping, household chores*
3. *help with paperwork, such as filling out forms, settling financial or legal matters*

Box 1: Questions on provision of informal care in SHARE survey

Independent variables

The process of modeling caring behaviour involves determining the observable individual characteristics that affect the probability that an individual becomes an informal caregiver for an elderly friend or relative inside or outside the household (Leontaridi and Bell, 2001).
The characteristics of informal caregivers have been widely researched before. Key socio-demographic and socio-economic factors that likely affect the provision of different kinds of informal care include age, gender, marital status, and education (Parker and Lawton, 1994; Young et al., 2005, Brandt et al., 2009). We split age into 5 categories to capture the non-linear effect of age. We also include dummies for gender and marital status in our analysis. Marital status dummy "married" includes all individuals who are married or living together with a partner. Finally, education is measured in the years of education received.

Demographic changes, such as the reduction of fertility rates and the subsequent declines in family size (Picard, 2011) limit families' ability to carry on the burden of caring for disabled people. Additionally, Brandt et al (2009) found that probability of providing help decreases with each additional sibling, although personal care does not seem to depend on the number of siblings. To account for these effects we include the number of living siblings in our model.

Also, the health of the caregiver influences the probability of care provision (Leontaridi, Bell, 2001; Young et al., 2005). However, health is considered endogenous to provision of informal care in the literature. The provision of informal care can result in health losses for informal caregivers, even leading to increased mortality risks. For example, a study by Schulz (1999) suggests that being a caregiver who is experiencing mental or emotional strain is an independent risk factor for mortality among elderly spousal caregivers. On the other hand,

Dixon et al. (2006) showed that improving patient quality of life may reduce the need for caregiver's time and also improve caregiver's quality of life. Moreover, providing informal care not only creates a burden for the caregiver and can impose negative health effects, but also gives substantial process utility to the caregiver. Brouwer et al. (2005) showed that almost half of the informal caregivers in the Netherlands (48.2%) derive positive utility from provision of informal care, and on average their happiness would decline if informal care tasks were handed over to someone else. Given these complex effects, the use of health variables in the empirical model of informal caregiving is limited. However, since we do not aim to establish the causal relation but merely to explain the cross-country variation in informal care levels, we do include the number of limitations with activities of daily living in our model as a measure of caregivers' health. This measure distorts the results the least, because the other available measures, like self-assessed health status are more susceptible to the reverse causality since they capture the emotional and physical strain created by caregiving.

Another determinant of informal care supply is carergiver's labour supply, as well as wages (Leontaridi, Bell, 2001; Young et al., 2005; Nizalova, 2010). These variables are also known to be endogenous to care. The existence of a formal care market enables individuals to substitute informal for formal care and individuals whose time costs are higher than the costs of formal care will do so (Pezzin and Schone,1999; Ettner, 1995, 1996). Care might also be taken up by individuals who lack necessary employment skills due to past life events such as prior caring spells, illness or parenthood. This suggests that people who work less hours and have lower salaries would be more likely to take up care. However, many carers combine work and caring responsibilities at the expense of career prospects, leisure time, income, and pension entitlements (Carmichael and Charles, 2003; Heitmueller, 2007) which suggests endogeneity. However, since the aims of this research focus more on explaining the differences in informal care levels than on establishing a causal relationship we include a dummy variable indicating that a person is employed (including self-employed). To distinguish between the effects of age and the change of employment status to retired, we include a dummy for the retired. The reference category – not-employed includes the work-disabled, unemployed, homemaker and other. We use house ownership as a proxy for income and wealth, since income is closely related to employment, while house ownership is less likely to be affected by short-term labour participation decisions.

Since a significant share of care is provided by children to their parents, having a living parent is an important prerequisite for this type of care. Moreover, having a parent who is in bad health would likely increase the probability of providing informal care. Thus we include dummy variables indicating that the person's mother or father is deceased, alive but in bad health, and in good health. This variable is derived from the respondents' assessment about their parents'

health. Assessment as excellent, very good and good is included in the category "good" and assessment as fair and poor – in the category "bad". We have to note that since this variable is not an objective health measure, it suffers from the same endogeneity issues as the other health measures, but as we mentioned before, causality is not our goal.

Young et al. (2005) found significant effect of ethnicity on provision of informal care in UK. Since SHARE is a multi-country survey not focusing on particular ethnicities, we will not include the ethnicity variable here. However, we do include a variable indicating that a person is born abroad, since that might be an indicator that the person's family is outside his/her country of residence and therefore the foreign born individuals are less likely to be providing informal care to family members.

There exists substantial evidence that there are cultural differences between northern and southern Europe (Bolin et al.,2008; Kohli et al.,2005). Southern European countries are found to be 'strong-family-ties countries' and their northern European counterparts as 'weak-family-ties countries' whereas the continental countries lie somewhere in between. The strength of family ties is discussed in terms of cultural patterns of family loyalties, allegiances, and authority, but it also concerns demographic patterns of intra-generational co-residence and patterns of support for the elderly. Moreover, cultural differences may be reflected also by a north-south gradient in the overall design of the welfare and long-term care systems of Europe. The design of the welfare system defines also 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). The more the responsibility lies with the individual and not with their family, the bigger the role played by the government (Pommer, 2007).

Oudijk (2011) found the North-South gradient also in motivations to care. In the Northern regions feelings of being needed and obligation increase the chance of informal care being given. However, in Southern Europe, where the legal responsibility for providing care lies with the family, they found that, contrary to expectations, older carers less often report that they feel needed or see being socially active as a way of contributing to society.

However, this division is not purely geographic. From the perspective of primary responsibility for meeting care needs, the Netherlands falls within the Scandinavian / Nordic group of countries as the public sector has primary responsibility for persons in need for care (Pommer, 2007), whereas Poland is closest to the Mediterranean/Southern model since the main responsibility for care provision rests with the family and the state does not support informal care providers (Marcinkowska, Sowa 2011).

Country group / cluster	Northern	Central Europe	Southern
Countries	Sweden Denmark Netherlands	Austria Germany France Belgium Czech Republic Ireland Switzerland	Spain Italy Greece Poland
Characteristics	Weak family ties Care responsibility – individual Big role for public provision	Moderate family ties Care responsibility – nuclear family Public services for more serious cases Cash benefits or public provision	Strong family ties Care responsibility – extended family Little (need-based, means tested) or none public support

Table 2: Clusters of countries according to the North-South gradient of long term care system characteristics.

Most of previous literature analyzing the determinants of care supply limits the attention on the transfers of time between children and their elderly parents (Bolin et al. 2008; Fevang et al. 2007; Sloan et al, 1997, 2002; Nizalowa, 2010; Zhu et al. 2003); however, Kalwij et al. (2012) found that relatives (other than children) and friends (including neighbors) provide about 30 % of the hours of informal home care and therefore it is important to take multiple care providers into account in order not to overstate the projected increasing costs of formal care programs due to the population ageing.

Our data (table 3) is in line with the findings of Kalwij et al. (2012). For example, in our sample, only 38% of the informal caregivers provide care to parents (natural, step-parents or in-laws). Other important groups to whom care is provided are adult children (30%) and friends/acquaintances (29%). Since the caregiver's time is constrained, considering only the child-parent relationship omits crucial information. Therefore we include care provided to all receivers in our analysis.

Dependant person	All carers	Personal care outside household	Care inside household	Household help	Help with paperwork
parent	38.47	59.12	28.78	38.85	54.41
spouse	4.77	7.97	16.15	4.52	4.67
sibling	9.31	10.77	7.25	9.42	11.01
child	29.58	12.32	31.26	32.95	21.76
other relative	10.96	14.69	10.97	10.48	11.44
friend	29.15	20.97	27.33	29.28	26.39

Table 3: The proportion of the different types of carers who provide care to the given type of receivers. (source: SHARE, wave 2)

One could also hypothesize that the different levels of informal care supply are caused by the different levels of disability or need for care. However, in the ANCIEN project Picard et al. (2011) showed that the disability levels in countries and regions are not correlated to the levels of

informal care supply and that these differences in the percentage of people providing informal care between countries reveal different propensities to provide informal care, which may be due to differences in preferences or as a consequence of the differences in individual and family circumstances and long term care systems. The robustness of this conclusion was reinforced by reaching the same results using both Eurobarometer and SHARE data.

Methods

To explain the differences in the informal care provision levels among the three clusters of countries, we start by providing the descriptive statistics of the explanatory variables and analyzing the differences in the levels in determinants among clusters of countries. We use a two-sample t test with unequal variances for continuous variables and proportion test for dummy variables to assess the size of differences between the clusters. If we find a significant difference in the distribution of a determinant this would indicate that for this variable the contribution of differences in the distribution of the variable on the variation in level of informal care across countries could be significant.

To illustrate the contribution of the effects of the individual characteristics associated with informal caregiving on the cross-country variation in informal care we constructed a regression model for each cluster for each of the outcome variables.

The most common regression models used for binary outcome variables are logit and probit. The choice between the two is often arbitrary, as they can provide very similar results (Wooldridge, 2009). In our case we chose logit based on slightly better results of goodness of fit measures and because it provides a closed form solution to the decomposition analysis, discussed later (Powers et al.,2011). Since the magnitude of coefficients in a logit model are not informative, to assess the magnitude of variable effects we provide average marginal effects, which result from averaging the individual marginal effects across the sample (Wooldridge, 2009).

Decomposition analysis

A full understanding of the differences in informal care supply among countries requires the disentanglement of the contribution of differences in the distribution of variables of differences in the effects of those variables. The decomposition analysis stems from Blinder – Oaxaca decomposition method (Blinder 1973, Oaxaca 1973). It is used to explain the gap in the means of an outcome variable between two groups. The gap is decomposed into two components – one that is due to group differences in the magnitudes of the determinants of the outcome in question, and the other that represents the group differences in the effects of these

determinants. However, Oaxaca decomposition cannot be directly applied to probit/logit models. Therefore we use a general-purpose multivariate decomposition method for nonlinear response models developed by Powers et al. (2006, 2011). In addition to the aggregate decomposition, this method provides a detailed decomposition that assesses the relative contribution of specific variables to each of the components and also the sampling variability.

As explained by Powers et al. (2011) the standard decomposition of a difference in first moments starts with the dependent variable as a function of a linear combination of predictors and regression coefficients:

$$Y = F(X_\beta) \tag{1}$$

where Y denotes the N × 1 dependent variable vector, X is an N × K matrix of independent variables, and β is a K ×1 vector of coefficients. F(·) is any once-differentiable function mapping a linear combination of X (X_β) to Y. The mean difference in Y between groups A and B can be decomposed as

$$\begin{aligned}\overline{Y}_A - \overline{Y}_B &= \overline{F(X_A\beta_A)} - \overline{F(X_B\beta_B)} \\ &= \underbrace{\left\{\overline{F(X_A\beta_A)} - \overline{F(X_B\beta_A)}\right\}}_{E} + \underbrace{\left\{\overline{F(X_B\beta_A)} - \overline{F(X_B\beta_B)}\right\}}_{C}\end{aligned} \tag{2}$$

The component labelled E refers to the part of the differential attributable to differences in distribution of covariates. The C component refers to the part of the differential attributable to differences in coefficients. Thus E reflects the expected difference if group A were given group B's distribution of covariates. C shows the expected difference if group B experienced group A's behavioural responses to X.

The detailed decomposition means that we wish to partition E and C into portions, E_k and C_k (k = 1, . . . , K), that represent the unique contribution of the k^{th} covariate to E and C, respectively. Yun (2004) suggested methods that use weights that are obtained from a first-order Taylor linearization of (2) around $X_A\beta_A$ and $X_B\beta_B$. The detailed decompositions obtained this way are invariant to the order that variables enter the decomposition, thus providing a convenient solution to path dependency, which is a known problem of non-linear decomposition. After linearization, the weight component for E is

$$W_{\Delta x_k} = \frac{\beta_{A_k}\left(\overline{X}_{A_k} - \overline{X}_{B_k}\right)}{\sum_{k=1}^{K} \beta_{A_k}\left(\overline{X}_{A_k} - \overline{X}_{B_k}\right)} \tag{3}$$

and the k^{th} weight component for C is

$$W_{\Delta \beta_k} = \frac{\overline{X}_{A_k}(\beta_{A_k} - \beta_{B_k})}{\sum_{k=1}^{K} \overline{X}_{A_k}(\beta_{A_k} - \beta_{B_k})} \tag{4}$$

$$\sum_k W_{\Delta x_k} = \sum_k W_{\Delta \beta_k} = 1.0 \quad (5)$$

Following Powers et al. (2011), we normalize the contribution of differences in coefficients of dummy variables and calculate standard errors using the delta method. See Powers et al.(2006, 2011) and Yun (2005) for further theoretical underpinning and application of this method of decomposition.

Results

Descriptive analysis

North-South gradient

We can observe a North-South gradient in the levels of informal care (Table 4). On average in our sample 32% people provide some kind of informal care outside the household. However in the Northern countries 45% people provide it, in Central Europe 36% while in the Southern countries only 20%.

If we look closer at the kinds of care provided outside the household, we see that the gradient disappears for the most demanding kind of care – personal care (only the difference between the North and Central clusters is statistically significant at 5% significance level, according to a t-test); however we see a strong gradient for the less demanding care types – help with paperwork and household help. In the Northern countries 39% of the sample provide household help to someone outside their own household, in the Central countries – 29% and in the South – 14%. Similarly in the Northern countries 15% of the sample provide help with paperwork to someone outside their household, in the Central countries – 11% and in the South – 7%.

The North – South gradient goes the opposite direction with the care inside household. In our sample 8.6% of the inhabitants of Southern countries care for someone inside the household, 6.5% in the Central Europe and only 4.3% in the Northern countries.

To paint a full picture we have to look also at the intensity of this care. Unfortunately our data structure does not allow us to identify the intensity of each type of care; however Table 5 summarizes the average total hours of care and help provided outside the household per year / week, conditional on it being provided. As we can observe, there are remarkable differences between the clusters of countries in this respect. In the North the caregivers provide on average 7 hours of care per week. In the Central Europe it increases to 11 hours per week and the most hours are provided in the South – on average, 20 hours of care and help are given per week outside the household. If we combine the probability of care with the conditional hours of care, we get the average hours of care provided in the total sample (Table 5). This lets us see the total

amount of care provided per person in Central and South clusters is approximately the same (4 hours per week), while in the North – lower (3.1 hours per week), however in the North this amount of care is spread over a larger number of caregivers than in the South and Central clusters. This raises the question, what are the factors that drive this different behavior. Is it because there are less people able and willing to provide care in the South, thus the differences are driven by the different characteristics of people or it is because there are different cultural norms and formal institutions regarding care, that lead to less people providing more intensive care in South than in the North.

	Percentage of the sample providing informal care				P-values of proportion test for differences between clusters		
	North	Central	South	Total sample	North/ Central	Central / South	North/ South
Care inside household	4.26	6.45	8.62	6.7	**0.000**	**0.000**	**0.000**
Personal care outside household	8.11	7.08	7.3	7.42	**0.025**	0.591	0.082
Household help	38.57	29.47	13.85	26.03	**0.000**	**0.000**	**0.000**
Help with paperwork	14.58	11.24	7.13	10.57	**0.000**	**0.000**	**0.000**
Total care and help outside household	45.41	35.76	20.08	32.43	**0.000**	**0.000**	**0.000**
Any type of care	47.65	39.8	26.52	36.9	**0.000**	**0.000**	**0.000**

Table 4: Percentage of people providing the given kind of informal care tasks

	Intensity of care and help outside household				P-values of t-test for differences between clusters		
	North	Central	South	Total sample	North/ Central	Central/ South	North/ South
Conditional hours							
Per year	358.8	586.5	1033.2	502.8	**0.003**	**0.011**	**0.000**
Per week	6.9	11.3	19.9	9.7			
Unconditional hours							
Per year	162.9	209.7	207.5	163.1			
Per week	3.1	4.0	4.0	3.1			

Table 5: Average total conditional and unconditional hours of care and help provided outside the household

Distribution of covariates

We continue our analysis by providing the descriptive statistics of the explanatory variables and analyzing the differences in the levels of covariates among clusters of countries (see table 6). Overall we observe that between the North and Central clusters there are the least number of significantly different levels of covariates. The distributions of covariates differ more between Central and South, and North and South clusters.

Overall, the age distribution curve seems the flattest in the South and the steepest in the Central cluster and the age distribution in South differs statistically significantly from the other two clusters. The age group 24 to 49 is very small in this sample, as expected from the design of the survey. Some proportion of these cross-country differences represents the actual differences in

age structures across Europe, however, the other part stems from the design of the SHARE study. First, some variation can be explained by the differences in the survey response rates and second, the survey does not include the institutionalized persons while there are large differences in the institutionalization rates among the countries. For example, the data from Economic Policy Committee (2006) report show that while in the Northern cluster country Sweden, 1.1% of the population receive formal long term care in an institution, in the Southern cluster countries Italy and Poland, only 0.3% of the population receive institutionalized care.

Next, 98% of the sample in Northern cluster are married or live together with a partner, 94% of the Central cluster and 90% of the South. All differences are statistically significant at 1% significance level. There is a slightly higher proportion of women in the sample in the Southern cluster than in the North or Central cluster. However none of these differences is statistically significant at 1% significance level. Also, percentage of people who own their home instead of renting it, do not significantly differ between the North and Central clusters while in the Southern cluster the proportion of home owners is higher.

When looking at the parental health indicators, we see that the mothers and also fathers are deceased for a bigger share of respondents in the South than in the other two clusters. This relates also to the differences in the age structure – there is a higher proportion of respondents in the oldest age groups in the South thus it is more likely that their parents are deceased. The mother's health is good for a significantly higher proportion of respondents in the North than the other two sectors, while it is described as bad significantly more in the Central cluster. The differences in the proportion of fathers with good health are significant between North and South, and the South has also significantly lower proportion of fathers with bad health.

The highest percentage of foreign born individuals is in the Central cluster, while the lowest – in the South. The differences are significant at 1% significance level.

There is also a clear North – South gradient in the proportions of employed, retired and non-employed individuals. The North has the lowest percentage of retired or non-employed individuals and highest – employed individuals of the three clusters, while the South has the lowest proportion of employed respondents and highest – retired and non-employed. All these differences, except the difference in percentages of retired individuals between Central and South clusters, are statistically significant at 1% significance level.

Also the average numbers of limitations with activities of daily living (ADL's) of the clusters follow the North-South gradient. Inhabitants of the Northern cluster have on average the least number of limitations and South – the highest. These levels differ significantly.

Next, the individuals in Northern cluster have on average completed the most years of education, while the South has the lowest education attainment. Also these differences are significant at 1% significance level.

Finally, in the Northern countries, respondents have on average the highest number of living siblings, followed by the South, and in the Central cluster- the lowest number of living siblings. Also these differences are significant at 1% significance level.

To sum up, there is some indication that the differences in the distribution of the covariates contribute to the differences in the informal care and help supply levels, as the North-South gradient that we found in the informal care provision levels is found also in many of the determinants. However, a large share of the North-South differences is probably driven by the differences in the age structure. The higher proportion of the oldest-old in the South may at least partially explain also the higher proportion of single individuals, women, deceased parents, more limitations with ADL's and lower employment levels.

	Frequencies (%) and means				**P-values of t-test / proportion test for differences between clusters**		
	North	**Central**	**South**	**Total sample**	**North/ Central**	**Central/ South**	**North/ South**
age24_49	2.8	3.51	3.45	3.31	**0.021**	0.826	**0.036**
age50_59	37.38	38.74	35.03	37.05	0.109	**0.000**	**0.005**
age60_69	36.81	33.9	31.73	33.83	**0.001**	**0.003**	**0.000**
age70_79	17.41	18.55	22.73	19.79	0.092	**0.000**	**0.000**
age80_104	5.59	5.3	7.07	6.02	0.449	**0.000**	**0.001**
Married	97.87	94.05	90.27	93.62	**0.000**	**0.000**	**0.000**
Female	51.69	51.46	53.26	52.17	0.792	**0.021**	0.075
Home owner	73.62	75	82.45	77.38	0.071	**0.000**	**0.000**
Mother deceased	73.69	73.1	75.28	74.05	0.445	**0.002**	**0.039**
Mother's health - good	14.86	13.32	13.61	13.81	**0.001**	**0.000**	0.675
Mother's health - bad	11.32	13.27	11.09	11.99	**0.011**	0.589	**0.043**
Father deceased	88.88	88.77	90.64	89.49	0.841	**0.000**	**0.001**
Father's health - good	5.72	5.51	4.57	5.22	0.323	**0.029**	0.334
Father's health - bad	5.08	5.46	4.71	5.09	0.595	**0.006**	**0.003**
Foreigner	5.98	10.64	2.13	6.37	**0.000**	**0.000**	**0.000**
Retired	41.57	47.00	47.46	45.82	**0.000**	0.554	**0.000**
Employed or self-employed	42.52	34.37	23.54	32.44	**0.000**	**0.000**	**0.000**
Unemployed	15.91	18.63	29.00	21.74	**0.000**	**0.000**	**0.000**
Limitations with ADL's	0.10	0.15	0.27	0.18	**0.000**	**0.000**	**0.000**
Education years	11.96	11.73	8.34	10.55	**0.000**	**0.000**	**0.000**
Number of siblings	2.73	2.50	2.64	2.61	**0.000**	**0.000**	**0.010**

Table 6: Descriptive statistics of the explanatory variables and the results of t-tests/proportion tests for differences between clusters. The differences that are significant at 5% significance level are marked bold.

Regression analysis

Table 7 summarizes the results of regressions run separately for each cluster and each kind of informal care. We present average marginal effects (AME) instead of the coefficients, since the non-linearity of regressions complicates the interpretation of coefficients.

Comparing the AME's, first we can see that the supply of household help is more elastic than the supply of other kinds of care, since the significant AME's of covariates for household help are bigger than they are for other types of care. Second, the determinants of personal care inside household differ fundamentally from the determinants of the care types outside household. For example, the signs for the AME's of age on provision of care inside household are positive, while they are negative for other types of care. Also, marital status has a significant effect only on provision of care inside household and not on the other types of care, while parental health, being born in another country and education has no effect on provision of care inside household but does have effect on other types of care. This difference at least partially stems from the fact that the receiver of care inside the household is different from that outside of household – it is less often the parent of sibling of the caregiver but more often a spouse or child compared to other types of care (see table 3).

Looking more closely at the covariates, we observe that age is a significant covariate for all four types of informal care analyzed in this paper; however, its effect differs among the types of care and clusters of countries. The most apparent difference is that while the average marginal effect of age is increasingly negative for the three types of informal care provided outside of household, it is positive for personal care inside of household. So, as people become older, they become less likely to provide care outside household, but more likely to provide care inside household. This suggests that although with age people become less able to provide care, they become more likely to live together with someone needing care, therefore the age variable also might be reflecting the changes in health status of the care receiver, for which we could not control in this research design. Also a North-South gradient seems to be present in the age gradient. For the two types of personal care – inside and outside of household we can observe that the age gradient is the weakest in the North and the strongest in the South, even though the signs are different. However, for the two less intensive kinds of care the age gradient seems to be the strongest in the North and the weakest in the South.

In the Northern cluster the individuals who are married or living with a partner have on average 3.8 p.p. higher probability of providing care within household than the single individuals, ceteris paribus. However, marital status has no effect on probability of care within household in Central and South clusters. This result seem counterintuitive since spouses are important receivers of

care within household (Table 3). However, it can be that the single individuals are more likely to provide care to a cohabiting parent or child than the married ones therefore obscuring the effect of the marital status. Moreover, being married does not affect the probability of providing the other three types of care.

Females are more likely to provide personal care outside and inside household than males. The increase in the probability of providing care inside household is significant and it amounts to 1.4 p.p. in the North cluster, 2.1 p.p. in the Central cluster and by 2.9 p.p. in the South, thus we observe the North – South gradient. However for care outside of household the effect is the biggest in the North and smallest in the Central cluster. Interestingly, females in the North are less likely than males to provide household help and help with paperwork, while females in the South are more likely to provide household help than males. In the Central cluster males and females are equally likely to provide household help and help with paperwork.

It seems that a substantial amount of household help and help with paperwork are provided to respondents' mothers, since if one's mother is deceased, they are less likely to provide these types of care than if their mother is alive and in good health. Moreover, we can observe the North – South gradient here. The decreases in probability are bigger in the North, where they amount to 10.8 p.p. (household help) and 7.1 p.p. (help with paperwork); and smaller in the South where they are only 3.1 p.p. (household help) and 3.8 p.p. (help with paperwork). People who have mother in bad health don't seem more likely to provide these types of help than people with mothers in good health, except for the help with paperwork in the Central cluster, where if one's mother is in bad health they are 2.4 p.p. more likely to provide help with paperwork than if one's mother is in good health. However, mother's health is relevant for the personal care outside household. Ceteris paribus, having a mother in bad health increases one's probability to provide personal care outside household by 3.7 p.p., 6.0 p.p. and 5.4 p.p. in North, Central and South clusters respectively if compared to having a mother in good health. In contrast, the fathers' health status does not affect the probability of providing any type of care. These differences between the effects of mothers' and fathers' health statuses stem from the differences in life course of men and women. In Appendix we can see that only 3% of our sample have an alive father and deceased mother while 19% of the sample have an alive mother and deceased father. Thus we can stipulate that, since mothers tend to outlive fathers, the mothers provide care to their husbands in need of care, but when the mother needs care herself, her husband is already deceased and therefore the children provide care to the mothers.

As mentioned before, being born in another country than the country of current residence does not affect the probability of providing care within the household; however it reduces the probability of providing all types of care outside the household. We can also observe differences between clusters in the magnitude of AME's for this covariate. The reduction in the probability

of providing personal care outside household and household help is the biggest in the North (3.8p.p. and 16 p.p.), smaller in the Central cluster (2 p.p. and 4.6 p.p.) and insignificant in the South. The decrease in the probability of providing help with paperwork is also the biggest in the North (6.1p.p.), but smaller in the South (5.8p.p.) and insignificant in the Central cluster.

The AME's of employment status variables vary a lot among the types of care and clusters of countries. Being retired decreases the probability of providing personal care outside household in the Northern cluster compared to being employed, however it increases the probability of providing personal care inside household and household help in Central and South clusters. The other non-employed individuals are more likely to provide personal care inside household in all three clusters than the employed individuals and the increase in probability follows a slight North – South gradient with AME's being 3.5 p.p. in the North, 3.3p.p. in the Central cluster and 2.7 p.p. in the South. Being non-employed in the Central cluster also increases the probability of providing household help by 3.6 p.p. but decreases the probability of providing help with paperwork by 1.9 p.p. compared to being employed.

Next, our results show that, ceteris paribus, an increase in limitations with activities of daily living (ADL) by one increases the probability of providing care inside household by 1.6, 1.1 and 1.4 p.p. in North, Central and Southern clusters respectively. This reflects the endogeneity of health measures in analyzing informal care. It is more likely that people with more limitations with ADL more often live together with someone needing care than that this is a causal relationship. The AME's of this variable for other types of care have the expected negative sign. An increase in limitations with ADL's by one decreases the probability of providing care outside household by 1.5 p.p. in the Southern cluster, but the decrease in probability is not significant in the other two clusters. Provision of household help is related to the physical health of the caregiver while provision of help with paperwork does not. Ceteris paribus, a one unit increase in limitations with ADL's leads to a reduction of probability of providing household help by 3.9p.p. in the North, 5.1p.p. in the Central cluster and 2.4 p.p. in the Southern cluster.

Our results show that education has no effect on provision of personal care inside household, while an additional year of education on average increases the probability of providing all other types of care except household help in the Southern cluster. We can also observe the North – South gradient in provision of personal care outside household and help with paperwork, since the AME's of an extra year of education are the biggest in the North and the smallest in the South.

Finally the number of siblings affects only the provision of help with paperwork in Central and South clusters. An additional living sibling decreases the probability of providing help with paperwork by 0.4 p.p. in the Central cluster and 0.5p.p. in the Southern cluster.

	Personal care outside household			Personal care inside household			Household help			Help with paperwork		
	North	Central	South	North	Central	South	North	Central	South	North	Central	South
age24_49	-0.0342 *	-0.0091	0.0080	0.0164	0.0304	0.0272	-0.0711 *	-0.0311	-0.0061	-0.0380	-0.0186	-0.0287 **
age60_69	-0.0025	-0.0158 *	-0.0077	-0.0119	-0.0107	0.0250 *	-0.0414 *	-0.0427 **	-0.0170	-0.0060	-0.0243 *	-0.0135
age70_79	-0.0283 *	-0.0412 **	-0.0251 **	0.0200	0.0118	0.0441 **	-0.1501 **	-0.1268 **	-0.0708 **	-0.0844 **	-0.0587 **	-0.0367 **
age80_104	-0.0213	-0.0419 **	-0.0498 **	0.0469 *	0.0503 **	0.0778 **	-0.2670 **	-0.2012 **	-0.1127 **	-0.0691 **	-0.0673 **	-0.0606 **
Married	0.0108	0.0000	0.0058	0.0377 **	0.0069	-0.0011	0.0032	0.0086	0.0221	0.0001	-0.0063	0.0111
Female	0.0659 **	0.0469 **	0.0586 **	0.0144 *	0.0205 **	0.0287 **	-0.0286 *	-0.0058	0.0366 **	-0.0281 **	-0.0016	0.0097
Home owner	-0.0114	-0.0020	0.0162 *	-0.0058	-0.0128 *	-0.0143	0.0010	0.0067	0.0035	0.0054	-0.0018	0.0006
Mother deceased	-0.0211	-0.0076	-0.0087	-0.0127	-0.0011	0.0097	-0.1083 **	-0.0795 **	-0.0305 *	-0.0707 **	-0.0659 **	-0.0376 **
Mothers health - bad	0.0370 *	0.0597 **	0.0543 **	-0.0021	0.0052	0.0367	0.0136	0.0147	0.0279	0.0243	0.0238 *	0.0169
Father deceased	0.0126	0.0084	0.0018	0.0113	0.0223	-0.0030	-0.0080	0.0088	-0.0017	0.0092	0.0163	0.0047
Fathers health - bad	0.0260	0.0257	0.0411	-0.0020	0.0199	0.0347	0.0551	0.0259	0.0224	0.0390	0.0134	0.0362
Foreigner	-0.0381 **	-0.0205 *	-0.0076	0.0037	-0.0037	-0.0139	-0.1597 **	-0.0460 **	-0.0268	-0.0609 **	-0.0041	-0.0584 **
Retired	-0.0299 **	0.0068	0.0052	0.0192	0.0312 **	0.0313 **	0.0147	0.0639 **	0.0289 *	-0.0044	-0.0005	0.0077
Non-employed	0.0018	0.0097	-0.0059	0.0351 **	0.0327 **	0.0266 *	-0.0010	0.0355 *	0.0009	-0.0213	-0.0187 *	-0.0096
Limitations with ADL's	-0.0139	-0.0110	-0.0154 **	0.0157 **	0.0113 **	0.0136 **	-0.0393 *	-0.0505 **	-0.0237 **	-0.0158	-0.0101	-0.0082
Education years	0.0037 **	0.0030 **	0.0022 **	0.0003	0.0000	-0.0014	0.0048 *	0.0080 **	-0.0003	0.0118 **	0.0071 **	0.0038 **
Number of siblings	0.0008	0.0013	-0.0012	0.0009	0.0011	-0.0010	0.0041	-0.0010	-0.0032	-0.0001	-0.0044 *	-0.0052 **
Number of observations	*5398*	*8347*	*7920*	*5398*	*8347*	*7920*	*5398*	*8347*	*7920*	*5398*	*8347*	*7920*

Table 7: Results of logit regressions – average marginal effects and statistical significance.

* statistically significant at 5% level

** statistically significant at 1% level

Decomposition analysis

In the previous sections we observed that there exist differences in the distribution of the covariates of informal care provision as well as differences in the effects of those covariates among the three clusters of European countries. To disentangle the effects of these two differences we did a multivariate decomposition analysis for each of the outcome variables. We will decompose only the differences between the North and South clusters, since overall, the differences between these two clusters in the levels of informal care supply are the greatest and also qualitatively, the long term care systems differ the most, as described earlier. This leaves us with 13 318 observations in the dataset which is enough for decomposition analysis.

Personal care outside the household

In table 4 we saw that the supply levels of personal care outside household do not statistically significantly differ between North and South clusters at 1% significance level, but the difference is significant at 10% level. Therefore we decomposed the small difference to see if the differences in the distribution of covariates and coefficients are also very small, or they are significant but cancel each other out.

As we can see in the decomposition results in table 8 the differences in the distribution of covariates are significant at 1% significance level and if no differences in the coefficients of those covariates existed, the gap between the two clusters would increase by 29%. In other words, if the institutional and cultural differences between the North and South would not exist, the difference in the supply levels of personal care outside household would increase from 0.8% to 1.1%. However, the contribution of differences in the coefficients has the opposite sign, thus limiting the gap between North and South clusters to its current size. This implies that the differences in population characteristics are compensated by cultural and institutional differences to achieve the existing proportion of individuals providing informal care outside household. This also reinforces our earlier conclusion that the supply of this type of care is need-driven and the institutions and cultural norms have adjusted to accommodate the demand for care.

The main contributor to the differences in determinants is the education level. If the South had the same education distribution as the North cluster, the difference in provision of personal care outside household would decrease by 87.9%. Equalization of age distribution, number of limitations with ADL's and parental health also would contribute to the reduction of the gap in levels of personal care provision. However, equalization of gender proportions and home ownership would increase this gap between the South and North clusters.

To sum up, the differences in personal characteristics of the caregivers between the North and South clusters would lead to a bigger gap in personal care supply outside household if they were not offset by the institutional and cultural differences of the clusters.

Personal care inside the household

Decomposition of differences in personal care provision inside the household shows different results than outside the household (Table 8). Firstly, the differences between the South and North clusters are significant and secondly, both the distribution of covariates and the coefficients contribute significantly to the total difference in care levels. In total, 31% of the difference is explained by differences in distribution of covariates and 69% - by differences in the coefficients and both of these numbers are significant at 1% significance level. If the distribution of the covariates in South cluster would be the same as in the North, the difference in the probability of providing care would decrease by 1.4 p.p., e.g. only 7.2% in the South would provide care inside household. However, if the coefficients in the South would be the same as in the North, the gap would decrease by 3 p.p. and thus only 5.6% would provide care inside household in the South. So the greatest part of the gap can be attributed to cultural and institutional differences between Southern and Northern Europe.

The main contributor to the differences in distribution is the difference in labor market status: the differences in employment levels explain 8.1% and the differences in retirement levels account for another 1.7% of the gap between the North and South clusters. The difference in the number of limitations with ADL's accounts for 5.1% of the gap. Other significant contributors to the gap are age distribution and gender.

Considering the differences coefficients, we see that marital status has the biggest effect. If the effect of being married in the Southern cluster would be the same as in the North, the gap in this type of care provision would increase by 106.4%. Equalization of limitations with ADL's would also increase the gap by 2.3%. However, age distribution has a positive contribution and its' equalization would decrease the gap by 12.6%.

To sum up, institutional and cultural differences play a crucial role in provision of personal care inside household. In particular, caregivers' responses to age, marital status and limitations with ADL's differ the most thus contributing to the differences in the levels of informal care provision between Northern and Southern Europe.

Household help

Next, we decompose the difference between South and North clusters in the provision of household help (table 8). The results show that 98.4% of the difference can be explained by differences in coefficients (significant at 1% significance level) and the differences in in the distribution of covariates are not significant. So, if the coefficients in the South would be the

same as in the North, the household help provision level in the South would increase by 24.3 p.p. and it would be close to the Northern level – 38.15% in South and 38.57% in the North.

The detailed decomposition shows that the only significant contributor to the covariates' part of difference is the age distribution, particularly the differences in the age groups 50-59 and 80-104, however their contribution is very small.

Considering the differences in coefficients, the biggest contribution comes from differences in effects of education - if the returns on education with respect to household help provision in the South would be the same as in the North, the gap in this type of care provision would decrease by 20.8%. Also, the gender has a remarkable effect. If being female would have the same effect in South as in the North, the gap in this type of care provision would increase by 8.3%, while if being male would have the same effect in South as in the North, the gap in this type of care provision would decrease by 7.8% .

In summary, the North – South difference in household help provision levels is driven by differences in coefficients, which implies that the cultural and institutional factors play a crucial role for this type of care.

Help with paperwork

Finally, we decompose the difference in the provision of help with paperwork (table 8). The results show that 77.7% of the difference can be explained by differences in coefficients and 22.4% - by differences in distribution covariates. Both parts are significant at 5% significance level. Thus if the distribution of the covariates in the Southern cluster would be the same as in the North, the level of help with paperwork in South would increase by 1.7 p.p., e.g. to 8.8%. And, if South would have the same coefficients as the North the level of help with paperwork in South would increase by 5.8p.p., e.g. to 12.9%.

As one could expect, education contributes the most to the differences in the provision of help with paperwork. If the education level in South would increase to the level of North, the gap in provision of help with paperwork would decrease by 18.6%. And, if the returns to education in terms of provision of help with paperwork in South would be the same as in North, the gap in provision of this type of help would decrease by another 64%.

The age contributes to both parts of the South-North difference – covariates and coefficients. Other covariates that contribute to the covariates' part of the difference are number of siblings, parental health and being born in another country.

Gender and the number of siblings contribute significantly to the coefficients' part of the difference. If the number of siblings in South would have the same effect as in North, the gap would decrease by 27.9%. Gender has opposite effects – if being female would have the same effect in South as in the North, the gap in this type of care provision would increase by 12.9%,

while if being male would have the same effect in South as in the North, the gap in this type of care provision would decrease by 12.1% .

To sum up, institutional and cultural differences play a crucial role in provision of help with paperwork. In particular, caregivers' responses to education differ the most thus contributing to the differences in the levels of informal care provision between Northern and Southern Europe.

Decomposition South vs. North								
	Personal care outside household		Personal care inside household		Household help		Help with paperwork	
	Covariates	Coefficients	Covariates	Coefficients	Covariates	Coefficients	Covariates	Coefficients
Contribution	**Pct.**	**Pct.**	**Pct.**	**Pct.**	**Pct.**	**Pct.**	**Pct.**	**Pct.**
age24_49	-2.0 **	-13.7	0.1	-0.5	-0.1	-0.5	-0.1	-0.2
age50_59	5.3 **	-9.2	1.6 **	-4.5	0.3 *	1.2	1.3 **	-11.1
age60_69	7.1	11.9	0.7	19.6 **	0.4	0.2	1.9 **	-3.1
age70_79	4.2	-6.6	1.2	-0.9	0.3	0.5	0.2	-9.8 *
age80_104	8.7 **	29.2	1.0 **	-1.1	0.4 *	0.6	1.4 **	5.6 *
Age total	*23.4*	*11.5*	*4.6*	*12.6*	*1.3*	*2.0*	*4.7*	*-18.5*
Married	2.5	21.9	0.1	-106.4 *	0.2	-6.6	0.6	-11.5
Single	2.5	-0.5	0.1	2.3 *	0.2	0.1	0.6	0.3
Female	-5.4 **	1.0	0.5 **	0.3	-0.1	-8.3 **	-0.1	-12.9 **
Male	-5.4 **	-0.9	0.5 **	-0.3	-0.1	7.8 **	-0.1	12.1 **
Home owner	-8.3 *	-103.1	-1.4	-1.4	0.0	-0.7	0.0	1.8
Rent	-8.3 *	36.9	-1.4	0.5	0.0	0.2	0.0	-0.6
Mother deceased	3.6 **	-10.2	-0.1	9.7	0.1	-4.7	0.6 **	0.8
Mothers health - good	-0.3 *	9.8	0.1 **	-3.6	0.0	1.0	0.0	0.3
Mothers health - bad	4.5 **	-10.8	-0.5 *	2.7	0.1	-0.4	0.4 **	-0.6
Father deceased	2.0	101.1	-0.5	-35.8	0.0	-2.2	0.2	7.0
Fathers health - good	-0.5	0.5	0.1 **	-0.2	0.0	0.0	-0.1	0.4
Fathers health - bad	2.8 **	-7.1	-0.6	2.5	0.0	0.2	0.3 *	-0.9
Foreigner	-1.7	-10.7	0.7	-0.9	-0.1	-1.2	-2.8 *	4.1
Born locally	-1.7	168.8	0.7	13.9	-0.1	18.2	-2.8 *	-64.9
Retired	-3.5	-106.9	1.7 *	3.7	-0.2	-3.5	-0.7	-4.9
Employed	0.5	38.1	8.1 **	6.7	-0.4	2.0	0.2	3.5
Non-employed	8.1	26.6	1.9	-3.9	0.2	0.6	1.6	0.6
Limitations with ADL's	27.7 **	3.0	5.1 **	-2.3 **	0.8	0.2	1.8	-0.1
Education years	87.7 *	137.0	11.5	-31.2	-0.2	20.8 *	18.6 **	64.0 *
Number of siblings	-1.2	52.6	0.2	-10.3	-0.1	9.0	-0.6 **	27.9 *
Constant		-387.6		210.1 **		63.8 **		70.0
Sum of contributions	128.9 **	-28.9	31.2 **	68.8 **	1.6	98.4 **	22.3 **	77.7 **
Difference in P(care)	-0.011 **	0.002	0.014 **	0.030 **	-0.004	-0.243 **	-0.017 **	-0.058 **
Total difference decomposed		-0.008		0.044 **		-0.247 **		-0.074 **

Table 8: Decomposition results (Each type of care: South vs. North) share of total difference explained by covariates and coefficients

* statistically significant at 5% level
** statistically significant at 1% level

Discussion and conclusions

As expected, we have found a North – South gradient in the proportion of population providing informal care across Europe. This gradient is the strongest for the "help" types of care – household help and help with paperwork. The direction of the gradient shows the highest proportion of help providers in the North cluster and the lowest – in the South. The gradient is weaker for the more demanding types of informal care – it is less strong and points the opposite direction for personal care inside household and disappears for the personal care outside household which suggests that these types of care are more need-based and less supply-driven than help in household and with paperwork. This conclusion is reinforced by the fact that the supply of household help is more elastic to changes in the caregiver's characteristics than the supply of other kinds of care

The intensity of care provided, however, does not follow a North-South gradient. The average hours of care given outside household per person in our sample are lower in the North and equally high in the South and Central clusters. Unfortunately our data did not allow us to paint the full picture on intensity of care, since the hours spent providing personal care inside household are not available in SHARE. However, we do know that in the Southern countries a higher proportion of individuals provide care inside the household than in the North. Thus, since in countries with highly developed long term care systems and informal care support (Northern cluster) more people are inclined to provide care and help, it results in less strain on caregivers than in countries with low support (Southern cluster). Thus, the countries, where the most demanding care tasks can be left to professional caregivers, enjoy higher total levels of participation in caregiving. Presumably, not being exhausted by the personal care tasks, the informal caregivers are more willing to participate in household and paperwork help. This suggests that the caregiver in the Southern countries might be over-exhausted and some population groups might be under-served. The strong family ties and family responsibility per se do not lead to higher levels of informal care.

Having observed these disparities we then set to discovering their sources. We discovered that the distribution of age, marital status, employment status, limitations with daily activities and education in our sample follow a North-South gradient, while for other variables it does not. However, a large share of the North-South differences is probably driven by the differences in the age structure. Thus we cannot base any conclusions on the descriptive statistics alone.

The results of the logit regressions showed that the supply of household help is more elastic than the supply of other kinds of care and the significant covariates of personal care inside household differ fundamentally from the significant covariates of the care types outside household. This difference at least partially stems from the fact that the receiver of care inside

the household is different from that outside of household – it is less often the parent of sibling of the caregiver but more often a spouse or child compared to other types of care. Moreover, for each type of care we found several variables that follow a North-South gradient in their magnitude of coefficients. The effects of age differ in sign and magnitude among the types of care, however for all of the care types there exists a North – South gradient in the magnitude of effect of age. Gender shows a North - South gradient in the supply of personal care inside household, household help and help with paperwork. Other variables that showed the North – South gradient for some of the care services are: having a deceased mother (household / paperwork help), being foreign-born (personal care outside household and household help), being non-employed (personal care inside household) and education (personal care outside household and help with paperwork). Since we observed the North-South gradient in the total levels of informal care supply, the distribution of covariates and their effects in form of the coefficients of logit regressions, we further decomposed the difference in informal care supply between North and South clusters to quantify the contribution of the differences in the distribution of covariates and their effects to the total North – South differences in informal care supply.

The decomposition analysis revealed that the North – South differences in the supply of personal care outside household would be bigger, if the contribution of the differences in personal characteristics of the caregivers was not offset by the institutional and cultural differences of the clusters. Overall, the mechanism behind provision of personal care outside household differs from the other kinds of care, since not only do the supply levels not follow a North – South gradient but also the contribution of institutional and cultural differences to the North-South gap is negative and very small.

Decomposition of differences in personal care provision inside the household showed that both the distribution of covariates and the coefficients contribute significantly to the North - South difference in the supply of this type of care with differences in coefficients accounting for the greatest part of the North-South gap in provision of personal care inside household. In particular, caregivers' responses to marital status were the most different. The big contribution of marital status clearly points to the different cohabitation patterns in the two clusters. In the North, where living together with adult children is uncommon, being married increases the probability of providing care inside household, while in the South, where intergenerational cohabitation is less uncommon, it does not.

Furthermore, the differences in coefficients are the main contributors to the North – South gap for the "help" types of care. Moreover, the differences in provision of household help are almost exclusively driven by the differences in coefficients. This shows that the household help provision is much more easily influenced by institutional changes than other types of care.

The detailed decomposition reveals where particular policies can be targeted to increase the participation rates in informal caregiving. So, for example, influencing the public opinion and encouraging the highly educated men to provide more help with household chores or paperwork to those who need it in the Southern countries, might reduce the North – South gap in the supply of these care types.

This paper provides a very broad view on the supply of informal care, analyzing the North – South differences across four types of care, but no distinguishing between the different care provider – receiver relationships. The literature and also our results suggest, that these relationships matter to the caregiver's decision to provide care, therefore a next step in this analysis would be to narrow it down to a single type of care and decompose the North – South differences into contribution of differences in characteristics and cultural and institutional differences for particular types of caregivers.

Also, this methodology did not allow us to distinguish between cultural and institutional factors in the decomposition analysis while our results suggested that they might obscure each other's effects. Some of the cultural factors that are likely to affect the supply of informal are the strength of family ties, cohabitation patterns and preferences regarding the long term care as well as attitudes and motivations towards caregiving. While availability of formal care, its eligibility criteria, legal responsibility to care and support to the informal caregivers are some of the institutional differences. Identifying countries, that differ in some but not all of these aspects and then decomposing the difference in informal care supply levels could reveal which of the cultural and institutional features have the greatest effects.

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Appendix

		Father		
		Alive	Deceased	*Total*
Mother	Alive	7%	19%	*26%*
	Deceased	3%	71%	*74%*
	Total	*11%*	*89%*	*100%*

Appendix A: A cross tabulation of number of observations with an alive or deceased father and mother.