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Your Next of Kin or your Own Career?
Caring and Working among the 50+ of Europe

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Your next of kin or your own career? Caring and working among the 50+ of Europe

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* Correspoding author. Address for correspondence: Lund University Centre for Health Economics (LUCHE), P.O. Box 705, SE-220 07 Lund, Sweden. Tel: +46 46 222 06 56. Fax: +46 46 222 06 51. Email: petter.lundborg@luche.lu.se. This paper uses data from the early release 1 of SHARE 2004. This release is preliminary and may contain errors that will be corrected in later releases. The SHARE data collection has been primarily funded by the European Commission through the 5th framework programme (project QLK6-CT-2001-00360 in the thematic programme Quality of Life programme area). Additional funding came from the US National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG- 4553-01 and OGHA 04-064). Data collection in Austria (through the Austrian Science Foundation, FWF), Belgium (through the Belgian Science Policy Administration) and Switzerland (through BBW/OFES/UFES) was nationally funded. The SHARE data set is introduced in Börsch-Supan et al. 2005; methodological details are contained in Börsch-Supan and Jürges 2005. Additional funding for the Swedish participation in the SHARE data collection project came from the Bank of Sweden Tercentenary Foundation, the Swedish Council for Working Life and Social Research, and the Swedish Social Insurance Agency. The research reported in this paper was supported by a grant from the Swedish Council for Working Life and Social Research, which is gratefully acknowledged. We are indebted to Rose-Marie Lindkvist for diligent research assistance.

Abstract

An increasing demand for both formal and informal care is likely to result from the ongoing demographic transition at the same time as there is a further move away from the traditional domestic division of labour. Public policy-making that aims at increasing the supply of informal care necessitates knowledge about the relative importance of various incentives for individual care providers. This paper takes as a point of departure that the willingness to supply informal care is partly explained by the extent to which it adversely affects labour market outcomes and analyses the effect on labour market outcomes of providing informal care to one's elderly parent(-s) among the 50+ of Europe. Data from SHARE (Survey of Health, Ageing, and Retirement in Europe) was used to examine the association between, on the one hand, hours of informal care provided and, on the other, (1) the probability of employment, (2) hours worked, and (3) wages, respectively. The results suggest that giving informal care to one's elderly parents is associated with significant costs in terms of foregone labour market opportunities and that these adverse effects vary between countries. The negative effect on the employment probability and the number of hours worked, respectively, of informal-care provision was found to be stronger in central Europe than in southern Europe, while the wage rate was found to be less negatively affected in the central European countries.

KEYWORDS: Informal care; Labour-market outcomes; Endogeneity; Europe; SHARE

Introduction

The simultaneous processes of a demographic transition, towards a higher share of elderly people in Europe, and the emancipation of women from being the sole providers of domestic labour mean that the demand for informal care will increase while the supply will decrease. If public policy-makers are anxious to increase the supply of informal care, the importance of incentives for individual care providers must be carefully studied. This paper addresses the question of whether or not the supply of informal care conveys costs to the provider over and above the immediate loss of income and whether or not the institutional context is important in this respect.

The individual's incentives for supplying informal care are comprised of a large array of benefits and costs. Apart from the willingness to provide informal care out of altruism, there are certainly several additional benefit-components, such as the fulfilment of what is considered an obligation and improved relationships (Bamford et al, 1998). At the cost side of the equation there is the opportunity cost of time. In principle, allocating time to informal-care purposes encompasses both direct and indirect costs. Direct costs are costs which arise when an hour is used for the provision of informal care instead of working in the labour market. Indirect costs are costs which are caused by disturbance of the process of human-capital accumulation – a student may suffer adverse effects from absence from school not only because he or she misses a day of schooling but also, and maybe more important, since there are accumulation effects over time of one day of missed schooling. Similarly, an employee may suffer not only one day's payment but also on-the-job-training, which will have accumulation effects over time. Further, the expectation held by an employer that, for instance, a specific employee will be more absent from work, or will be less devoted to his or her career, since he or she has supplied significant amounts of informal care at the expense of job devotion in the past, may reinforce the adverse effects on human-capital accumulation and, hence, wages. These adverse effects may be different depending on the specific institutional setting of a country. Thus, the various institutional settings that exists in different parts of Europe may induce different patterns.

Despite their (potentially) important policy implications, relatively few studies outside the US have analysed the relationship between informal-care provision and labour-market outcomes and how these influences depend on the institutional setting. For US conditions, Wolf & Soldo (1994) found no effect of giving informal

care on employment or hours worked among married women, but most prior US studies have identified large opportunity costs of informal care in the form of reduced occupational attainment (Muurinen, 1986; Stone & Farley-Short, 1990; Boaz & Muller, 1992; Ettner, 1996; Pavalko & Artis, 1997; Johnson & Lo Sasso, 2000; Kolodinsky & Shirey, 2000; Pavalko & Henderson, 2006). Outside the US, a few studies for British conditions exist (Arber & Ginn, 1995; Carmichael & Charles, 1998; Carmichael & Charles, 2003a; Carmichael & Charles, 2003b; Heitmueller, 2004). In the latter studies, a negative effect on informal-care provision was obtained, although the magnitude of the effect varied.

In this study, we focus on the effects of informal-care giving on labour market outcomes and on differences in the effects between European regions. The European setting should be particularly interesting, since norms, policies, and legislations surrounding informal care vary greatly across European countries. Until recently, such analyses have been hindered by a lack of comparable data. With the recent development of the SHARE (Survey of Health, Ageing, and Retirement in Europe) database, however, new, cross-national research possibilities within a European context appear. In our analyses, we take advantage of the cross-national character of SHARE and examine differences in the effects of care-giving on labour-market outcomes according to a north-south gradient. The north-south gradient is motivated by the fact that there exist considerable cultural differences between northern and southern European countries that may be of importance when studying informal care and labour market outcomes. Southern European countries are commonly referred to as "strong family ties countries", and are often contrasted with the "weak family ties countries" of Northern Europe (Reher, 1998). The strength of the ties is usually discussed in terms of cultural patterns of family loyalties, allegiances, and authority, but also concerns demographic patterns of intra-generational co-residence and patterns of support for the elderly.[1] Kohli et al. (2005) also associate the "weak-strong" dichotomy to a European North-South gradient. Here, the Scandinavian countries are found to have the "weakest" family ties, the Mediterranean countries the "strongest", whereas the continental countries lie somewhere in between. These patterns are also reflected by the fact that public spending on long-term care varies to a large extent between Northern and Southern European countries. For instance, spending varies from €4,764 per capita for people aged 90 to 94 in Italy to €22,336 in Denmark, reflecting the more extensive reliance

on informal care provision in Italy (Economic Policy Committee, 2001). One may assume that the potential adverse effects of informal care on labour-market outcomes are different in countries where norms favouring family loyalties and intra-generational support are stronger, since more acceptance will exist among employees and co-workers, for instance, when caring for one's elderly parents.

In most prior studies, informal care has been treated as an exogenous variable. As noted by Ettner (1996), this means that a number of implicit assumptions are made. First, it assumes that the allocation of care-giving tasks within the family does not depend on endogenous characteristics of the children, such as employment status. Second, it assumes that there is a required amount of "needed" informal care that the family does not allow to leave unmet. Third, it assumes that the family caregivers cannot substitute informal care by buying formal care. Given these assumptions, an informal caregiver takes the required level of informal care as given and then decides how to allocate remaining time. Obviously, if the parent's demand for informal care increases, this means that less time will remain to spend in paid work.

For a number of reasons, however, these assumptions may fail. The allocation of the caregiving burden within the family may certainly depend on the endogenous characteristics of the children. Unemployed children, for instance, face lower time costs and may be expected to provide a greater share of the total amount of informal care than their employed counterparts. In the literature, a typical care-giver has been found to be an unemployed, single-living daughter, living nearby the parent (Engers and Stern, 2002). Similarly, children with a time cost that exceeds the price of professional homecare may decide to pay for formal care instead of providing informal care. Finally, the assumption that there is a certain amount of required informal care that has to be provided is questionable. Consider a model of care-giving where the child's utility function includes the parent's level of health (Johnson & Lo Sasso, 2000) or the parent's utility (Ettner, 1996), because of altruistic and/or bequest motives. Moreover, the health or utility of the parent is a concave function of the amount of informal care provided by the child. The child will then provide informal care up to the point where the marginal utility of the time spent on various activities are equalised. So, in equilibrium, the child will allocate his/her time so that the marginal utility of care giving equals the marginal utility of leisure and the value of an additional hour of work. A positive chock in the marginal utility of informal care will

induce the child to increase the time spent on informal care and reduce the number of hours on leisure and/or paid work, in order to restore equilibrium conditions.

In the scenarios above, informal care is a choice variable that is endogenously determined within the model. Empirical estimates of the effect of informal care-giving on labour supply based on simple OLS regression are therefore potentially biased towards overstating the effect (Ettner, 1996). In this paper, we address the potential endogeneity of informal care by using instruments for informal care. In particular, the SHARE database contain information on the respondent's parents, such as their age and health status, and on the number of siblings of the respondents, which are used to identify the effect of informal care on occupational attainment.

We consider the effects on employment, hours worked, and the wage rate among both men and women of care-giving to an elderly parent. Most prior studies only concerns the probability of employment and are only conducted for women, who traditionally have been the main providers of informal care. However, as the female labour market participation rate has been increasing in many countries, men are becoming more important as care providers (Carmichael & Charles, 2003a).

To summarise our results: We found (1) that informal care reduced the probability of employment among women and men, (2) that informal care reduced the number of hours worked when analysing women and men together and (3) that informal care showed no significant effect on the wage rate, neither among men nor among women. Thus, our results suggest that giving informal care is associated with a substantial opportunity cost in the form of reduced occupational attainment. The hypothesis that informal care is exogenous could not be rejected. The influence of informal-care provision was, however, found to differ between the nordic, central and southern parts of Europe: the negative effect on the employment probability and the number of hours worked, respectively, of informal-care provision was found to be stronger in central Europe than in southern Europe, while the wage rate was found to be less negatively affected in the central European countries.

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

Data

The Survey of Health, Ageing and Retirement in Europe (SHARE) is a multidisciplinary and cross-national micro database containing approximately 22,000 Europeans over the age of 50 and their spouses and from 11 countries. The first wave of data was collected in 2004. It contains representative samples from the non-institutionalised population in respective participating country. The countries represent northern Europe (Denmark and Sweden), central Europe (Austria, France, Germany, Switzerland, Belgium, and the Netherlands), and southern Europe (Spain, Italy and Greece). In this paper, data from Belgium was not included, since it was not available at the time of writing. The database comprises information on health-related variables, for instance, self-reported health, physical functioning, cognitive functioning, psychological health, well-being, life satisfaction, and health-behaviour, for instance, the utilisation of health-care facilities; labour-market variables, for instance, current work activity, job characteristics, opportunities to work past retirement age; economic variables, for instance, sources and composition of current income, wealth and consumption. Other variables include education, housing, and social support variables, for instance, assistance within families, informal care, transfers of income and assets, and social networks.

SHARE follows the design of the U.S. Health and Retirement Study (HRS) and the English Longitudinal Study of Ageing (ELSA). Response rates in SHARE ranged from 38% in Switzerland to 69% in France and the average response rate was 55%. A description of methodological issues can be found in Börsch-Supan & Jörges (2005).

In our analyses, we considered informal care given to the respondent's parents. We included biological parents and parents-in-law, as well as step-parents. Moreover, we considered informal care given to parents living outside the household in our main analyses. Even though the data contains information on informal care to a parent living in the household, this measure was limited in several respects. In contrast to informal care given to a parent outside the household, it was only recorded whether or not the respondent had given any informal care to a parent living in the household. Thus, this restricted the possibility of calculating the total number of hours of informal care given to parents living both outside and in the household. The exclusion of informal care constituted no major limitation, though, since in our sample of 50+, the number of respondents that gave such care was very low. In 5 out of the 10 countries considered, the fraction of respondents that gave informal care

given to a parent in a household was negligible. In Denmark and France the number was zero, whereas in Sweden, Netherlands, and Greece, the proportion ranged from 0.2% to 0.9%. For the full sample, only 1.7 % had given such care, while 41 % had given informal care to a parent living outside the household. There were some variations across countries, though. The highest proportion of respondents having given care to a parent in the household was found in Spain, where 6.8% of the respondents had given such care. We will, therefore, return to the issue of informal care provided in the household, when conducting a sensitivity analysis of our results.

A smaller fraction of individuals also reported providing care to a spouse within the household. Such care was also measured only through a binary indicator, giving no information about the intensity of the care-giving. However, it should be remembered that our sample consists of labour market participants and this source of care-giving is more common at advanced ages. Consequently, only 1.8% of the respondents reported supplying such care, making this source of care-giving less important than care-giving to parents outside the household. In addition, no information on the intensity of care provided to the spouse was given and, again, only a binary indicator of such care-giving was included in the data set. We will therefore return to the issue of spousal care-giving in the sensitivity analysis.

Finally, the sample was restricted to respondents having at least one living parent, since, obviously, only those had the possibility to give informal care to a parent.

Since we were interested in the effects of informal care-giving on labour market outcomes, we restricted our sample to non-retired individuals. Since some individuals were "home-makers", and consequently had no job to retire from, we also imposed an upper age limit for inclusion of 64.

Informal care

Informal care was comprised of the following components: (1) personal care, e.g. dressing, bathing or showering, eating, getting in or out of bed, and using the toilet, (2) practical household help, e.g. with home repairs, gardening, transportation, shopping, and household chores, and (3) help with paperwork, such as filling out forms, and settling financial or legal matters.

In the survey, the respondent was first asked if he/she had given any informal care of the above kind to a family member outside the household, a friend or

a neighbour during the last 12 months. If answering yes, the respondent was next asked to whom he/she had given informal care. For that person, the respondent was then asked to estimate the frequency of which he/she gave informal care during the past 12 months. The alternatives given were: (1) almost every day, (2) almost every week, (3) almost every month, and (4) less often. Following that, the respondent was asked to give an estimate of the number of hours of informal care given on a typical day/in a typical week/in a typical month/in the last twelve months. The interviewer was then asked to round up the answers to full hours. This exercise was repeated for up to 3 different persons. In order to make the answers comparable between respondents, we created a variable indicating for each respondent the total number of hours past week that he/she gave informal care. This variable was constructed as follows: If the respondent answered that he/she gave informal care almost every day, we multiplied the number of hours received on a typical day by 7. If the respondent answered almost every week, the number of hours was kept as it was. In a similar vain, if the respondent answered almost every month, the number of hours per months were divided by 4.28. Finally, if the respondent answered that he/she gave informal care less often than each month, he/she was asked to give an estimate of the total number of hours of informal care received past year. This estimate was then divided by 52. In Table 1, descriptive statistics on informal care-giving are shown.

---- TABLE 1 ABOUT HERE ----

Employment, hours worked and wages

Three different labour market outcomes were addressed in this paper: (1) being in paid employment, (2) hours worked, and (3) hourly wage rate. To obtain an estimate of hours worked, the respondent was first asked to state the number of contracted hours each month in his or her job, excluding meal breaks and any paid or unpaid overtime.

To assess the respondent's hourly wage rate, the respondent was first asked about the frequency of payment. Second, he or she was asked about how much the last payment was, before deductions for tax, national insurance or pension and health contributions, union dues and so on. Together with the information on contracted hours, the hourly wage rate was then calculated. For the non-euro countries, i.e. Sweden, Denmark, and Switzerland, we used the average annual

exchange rate of 2004 to convert the amounts into euros. The exchange rates used were 9.1243 for Sweden, 7.4399 for Denmark, and 1.5438 for Switzerland (ECB, 2005). Table 2 shows descriptive statistics on the labour-market variables across the SHARE countries.

---- TABLE 2 ABOUT HERE ----

Other explanatory variables

In the employment regressions we control for sex (female vs. male), age and age squared, marital status (married vs. others), education (total years of education), birth country (born in interview country vs. all other), number of children, wealth[2], health (bad or very bad self-reported health vs. all other), number of health conditions (out of 14 listed)[3], and country dummies (Sweden as reference category). The same explanatory variables were included in the wage equation, while the equation on hours worked included the wage rate as an additional explanatory variable. Moreover, the hours worked and wage equations also included an indicator of being employed in the public sector, as opposed to being employed in private sector. Finally, the wage equation included a variable indicating having a part-time job. In Table 3, description statistics are given.

---- TABLE 3 ABOUT HERE ----

Instruments

Variables that were assumed to influence the amount of informal care given, but not directly the labour market outcomes of the respondent, were the health status of the respondent's mother and father, the age of the mother and father, whether the parents lived more than 100 km away, and the number of sisters and brothers.

The health status of the respondent's parent should qualify as an excellent instrument, since it should not affect labour-market outcomes of the respondent other than through its effect on informal care-giving by the respondent. Moreover, since we control for the health status of the respondent, any transmissions of health through the generations will be accounted for. To evaluate parental health, the respondent was asked to rate his/her parent's health on a 5-point scale, ranging from very good to very bad. A binary indicator of having a parent with bad or very

bad health was then created. Since one of the parents may be deceased, we constructed an indicator variable taking on the value 1 if the mother or father, respectively, was dead. In the case of a deceased parent, we assigned the parental health indicator the value one.

Regarding age, we assumed that age is associated with the demand for informal care. Age could be expected to capture other characteristics of the elderly parent, such as activity limitations, which may increase the need for informal care. The age of the parent, however, could, again, be assumed to only affect the care-givers labour market status via its effect on informal care-giving. The variable indicating whether the mother/father lived more than 100 km away is related to the time cost of providing informal care. With greater distance between the informal care-giver and the care-receiver, time costs for the former will obviously increase, which could be expected to decrease the amount of informal care provided. Again, distance could be assumed not to influence the labour-market status of the respondent other than via its effect on informal care-giving.[4] In the case where the mother or father was deceased, a similar strategy as in the case of parents' health status was followed.

The rationale for including the number of siblings alive is that the workload on the respondent may lessen with additional siblings, since the burden of informal care-giving could be shared (Ettner, 1996).

Methods

A probit model was used to analyse the probability of being in paid employment. When estimating hours worked and wages, conditional on being in paid employment, OLS was used. In the latter cases, the dependent variables were logged in order to achieve a smoother distribution. Formally, we may write the labour-market outcomes as:

$$L_{ij} = f_j(IH_i, H_i, X_i, I_i, \varepsilon_{ij}), \qquad j = 1,2,3 \qquad (1)$$

where L_{ij} denotes labour market outcome of type j by respondent i and IH_i denotes hours of informal care. In equation (1), H_i denotes health status, X_i socio-economic and demographic characteristics, I_i the institutional framework, and ε_{ij} an unobserved

error term. The institutional framework varies between the countries of European countries, a fact which is "captured" by country dummies in the regressions.[5]

Results – all countries

Employment

In Table 4, we present the results from the regressions on employment probabilities treating *informal care as exogenous*. The results are shown for the full sample and for men and women separately. For the full sample, informal care was associated with a negative and significant effect on the employment probability (-0.037). This effect was quite similar among men and women. For men, the effect was –0.032, while the corresponding effect for women was –0.028. In both cases, the effects were significant at the 10% level. Among men, age, wealth, education, being married, and being born in the interview country showed a significant and positive impact on the employment probability, while being in bad health and the number of health conditions showed a negative impact. For women, the employment probability was positively associated with age and education, while the contrary was true for age squared, being married, number of children, bad health, and the number of health conditions.

If our assumption of informal care being exogenous holds, the results suggest that, for the full sample, a 10 % increase in weekly hours of informal care is associated with a 3.7 percentage points reduction in the employment probability. These estimates may, however, be biased due to the potential endogeneity of informal care, as explained earlier.

---- TABLE 4 ABOUT HERE ----

Table 5 presents the results from the instrumental variables regressions, treating *informal care as endogenous*. To preserve space, only the marginal effect of informal care is shown.[6] The instruments used in each regression are summarised below the table. Treating care-giving as endogenous, the magnitude of the marginal effect, -0.224, was larger than the one we obtained when treating informal care as exogenous. The effect, however, was only significant at the 11% level. Moreover, the

Smith-Blundell test could not reject the null hypothesis of exogeneity of informal care ($p = 0.16$).

The reliability of the IV-estimates hinges on a number of factors. First, we want the identifying instruments to be strongly correlated to our endogenous regressor (informal care). Appropriate instruments should be 1) correlated with the potentially endogenous right-hand-side variable and 2) orthogonal to the error process. It has been suggested, as a rule of thumb, that an *F*-statistic below 10 is a cause of concern, since it signals a problem of weak instruments (Staiger and Stock 1997). An F-test of joint insignificance revealed that our instruments predicted well in the first-stage regression ($F = 9.24$, $p < 0.01$). Second, the validity of our exclusion restrictions was tested by including all but one of the instruments in the equation that controls for endogeneity and testing them being jointly equal to zero with a Wald test. The choice of instrument to exclude does not affect the results (Bollen et al., 1995). With valid exclusion restrictions, these should not be significant predictors of employment after controlling for informal care (Bollen et al., 1995; Norton et al., 1998). The Wald-test suggested that the overidentifying restrictions were valid ($\chi = 1.15$, $p = 0.56$).

While exogeneity of informal care for the full sample could not be rejected, it remains to settle whether this is the case when examining women and men separately. Starting with women, the effect of informal care was -0.158, when treating informal care as endogenous. The effect was highly insignificant and the confidence intervals of the instrumental variables estimate overlap with the original estimate, though. As to the appropriateness of our instruments, the hypothesis that they were jointly equal to zero in the first-stage regression on informal care was rejected ($F = 8.53$, $p < 0.01$). Moreover, the instruments, that were excluded from the main equation, passed the test of overidentifying restrictions ($\chi = 1.50$, $p = 0.47$). As in the case of the full sample, the Smith-Blundell test could not reject the exogeneity of informal care ($\chi = 1.04$, $p = 0.31$).

Turning to men, our instruments appeared weak in predicting informal care. In fact, none of the instruments were significant in predicting informal care even at the 10% level. Consequently, IV-regression on employment could not be conducted in the case of males.

In sum, the results suggested that for the full sample, informal care showed a negative and significant effect on the employment probability. Moreover, in

this specification, we could not reject the hypothesis that informal care is exogenous. Separate regressions for men and women revealed that the negative effect was roughly equal in magnitude and significant for both women and men. Among women, exogeneity of informal care could not be rejected. In the case of men, we could not test the hypothesis of care-giving being exogenous, due to lack of instruments.

---- TABLE 5 ABOUT HERE ----

Hours worked

In Table 6, the results from the work hours regressions are presented, *assuming exogeneity of informal care*. The analyses were conducted conditional on having a positive number of work hours. In the first column, the results for the full sample are shown, while column 2 and 3 shows the results for women and men separately. For the full sample, the effect of informal care was –0.026. The effect was statistically significant at the 5 % level. Since both work hours and hours of informal care are specified in log form, the estimate has an elasticity interpretation; a 10 % increase in weekly hours of informal care given is associated with a decrease in weekly work hours by 2.6 %. The effect differed by gender, though; for women the effect was –0.03, while for men the corresponding effect was –0.01. For women, the effect was only significant at the 11 % level, while the effect among men was far from being significant ($p = 0.48$). Among men, higher wage and being in bad health was negatively and significantly associated with hours worked. Among women, being married showed a negative effect on hours worked, while total years of education showed the opposite effect.

---- TABLE 6 ABOUT HERE ----

The regression treating *informal care as endogenous* is shown in Table 7. In this specification, the effect of informal care was 0.078. The effect was not significant, however. We rejected the hypothesis of the instruments being jointly equal to zero ($F = 7.44$, $p < 0.01$). Moreover, the Sargan test for identifying restrictions could not reject the null hypothesis that the instruments could be validly excluded from the main equation ($\chi = 0.05$, $p = 0.83$). Finally, the Durbin-Wu-

Hausman test could not reject the hypothesis that informal care was exogenous (χ = 0.57, p = 0.45).

It remains to check whether the exogeneity assumption holds when analysing hours worked for men and women separately. The estimated effect of informal care on hours worked among women, when treating the former as endogenous, was 0.138. The effect was far from being significant, however, and, again, the confidence intervals by large overlapped the effect of informal care under the exogeneity assumption. We could reject the hypothesis of the instruments being jointly equal to zero (F = 6.75, p < 0.01). The instrument set passed the Sargan test of overidentifying restrictions (χ = 1.85, p = 0.17). As in the case of the full sample, the Durbin-Wu-Hausman test could not reject the hypothesis of exogeneity (χ = 1.25, p = 0.26).

For men, the effect of informal care on hours worked, when treating the former as endogenous, was -0.110. As was the case for women, however, the effect was far from being significant. Among the instruments, only the indicator variable of whether or not the mother lived more than 100 km away predicted informal care. However, this instrument was only significant at the 9% level in the first-stage regression. This suggests that we have a case of a weak instrument, suggesting that the results should be interpreted with caution. Since only one instrument was used, we were unable to test the exclusion restriction. Using this sole instrument, the assumption of exogeneity of informal care could not be rejected (χ = 0.13, p = 0.72).

To summarise: for the full sample, the effect of informal care on hours worked was significant and negative. A 10 % increase in informal care given was associated with a 2.6 % reduction in the number of hours worked. The effect differed by gender, though; the effect among women (-0.030) was greater than the effect obtained among men (-0.010). When analysed separately, however, the effects were not significant for neither women, nor men. Finally, we were unable to reject the hypothesis of exogeneity of informal care, both when examining the full sample and when analysing men and women separately.

---- TABLE 7 ABOUT HERE ----

Wage rate

Table 8 presents the results from the wage equation, *treating informal care as exogenous*. The analyses were conducted for those having a wage rate > 0. For the full sample, the effect of informal care was small (0.008) and statistically insignificant. The effect differed by sign between men and women, though. For women the effect was 0.022, while for men it was -0.006. The effect was insignificant in both cases, however. Among women, wealth and years of education were positively related to the wage rate, whereas bad health showed a negative effect. Among men, wealth, education, being married, showed a positive effect on the wage rate, whereas working in the public sector showed a negative impact.

---- TABLE 8 ABOUT HERE ----

In Table 9, the effects of informal care on the wage rate, *treating the former as endogenous*, are shown. For the full sample, the estimated effect was –0.258. The effect was statistically insignificant, however. Our instrument set consisted of the variable indicating whether or not having a father with bad health, and the two variables indicating whether or not having a mother or a father living more than 100 km away. With these instruments, the hypothesis of them being jointly equal to zero could be rejected ($F = 5.26$, $p < 0.01$). Moreover, the validity of our exclusion restrictions could not be rejected ($\chi = 0.69$, $p = 0.71$). Finally, the Durbin-Wu-Hausman test could not reject the hypothesis of exogeneity ($\chi = 2.13$, $p = 0.14$), lending support to the specification were informal care was treated as exogenous.

For females, the effect of informal care on the wage rate was -0.098, when it was treated as endogenous. It was, however, far from being statistically significant. Again, we could not reject the hypothesis of informal care being exogenous ($\chi = 0.49$, $p = 0.49$). Our instruments in the first-stage regression, the indicator of father's health and the indicator of having a mother living far away, predicted rather well ($F = 7.40$, $p > 0.01$) and the validity of the exclusion restrictions could not be rejected ($\chi = 0.04$, $p = 0.83$). For males, no instruments were found to predict informal care. Thus, IV-estimates could not be produced in this case.

To summarise, no effect of care-giving on the wage rate was obtained. This was true both when analysing the full sample and when conducting the analysis separately for men and women. Finally, the exogeneity of informal care could not be

rejected for the full sample or for the sample of females. For males, our instruments performed poor, meaning that no IV-estimates could be produced.

---- TABLE 9 ABOUT HERE ----

Results by country groups

In order to test for differential effects of informal-care provision on employment, hours worked, and wages, respectively, according to a north-south gradient, the participating countries were divided into three sub-groups: (1) Sweden and Denmark (Nordic); (2) Germany, France, Netherlands, Austria, Switzerland (Central); and (3) Spain, Italy, and Greece (South). In order to investigate whether the effects differed between these country groups, we created interaction variables between the amount of informal care received and country group. The same regressions as before were estimated, including the interaction terms as explanatory variables (together with the country group dummies). The omitted reference category was the country group southern Europe (and, hence, the interaction between southern Europe and informal care). The results are shown in Table 10. For convenience, only the interaction effects and the main effects are presented. The latter consist of the informal care variable and the country group dummies. The country group dummies are the ones shown in the bottom half of Table 10.

In the second to fourth columns of Table 10, the results from the employment regression are presented. For the full sample, both of the included interaction terms were insignificant. The regression performed for men and women separately, however, revealed that men residing in central Europe faced a larger negative effect of providing informal care on the employment probability than men in southern Europe. For women, no significant differences between country groups were found.

In columns five to seven of Table 10 the results for the regressions on hours worked are presented. For the full sample, we found that residing in central Europe rather than in southern Europe increases the negative effect of hours of informal care provided on hours worked. No significant difference in the influence of informal-care provision on hours worked was found between those residing in the Nordic countries and those residing in southern Europe. The regressions employing female and male samples, respectively, indicated that the negative effect of informal-

care provision on hours worked faced by central Europeans was significantly greater for both men and women than the corresponding effects faced by southern Europeans. Moreover, men residing in the north of Europe faced a larger negative effect on hours worked of informal-care provision than their corresponding peers in southern Europe.

Finally, in columns eight to ten of Table 10, the results from the regressions on wages are presented. For the full sample, the estimated marginal effects did not reveal any differences in informal-care provision effects between country-groups. The result obtained for the female sample, however, implies that the negative wage-rate effect suffered when supplying informal care is lower for women living in central and north of Europe, respectively. Men residing in the north of Europe were not found to differ from their corresponding peers in southern Europe regarding the wage-rate effect of informal care provision.

In conclusion, the regressions including interaction terms revealed that the effects of informal-care provision on labour-market outcomes seem to differ to some extent between different parts of Europe.

---- TABLE 10 ABOUT HERE ----

Sensitivity analysis

In Table 11, we present the results from regressions that include the indicator of having given informal care to a parent living in the household and/or to a spouse within the household. Of primary interest is to what extent the effect of giving informal care to a parent outside the household changes, when including the former. If so, its omission in our main regressions might be of serious concern. However, as shown in Table 11, the effect of having given informal care to a parent in a household is significant at conventional levels in only 2 of the 9 equations estimated. Moreover, the indicator of having cared for a spouse in the household is significant in only one of the 9 regressions (and borderline significant in one additional regression). Most importantly, in these regressions, the effect of having given informal care to a parent outside the household is virtually unchanged when including these additional indicators of care-giving. In sum, the omission of the indicator of informal care to a parent and/or a spouse within the household in the main regressions seems to be of no great concern, since (1) its inclusion did not change the effect of our variable of main interest, (2) it was insignificant in the majority of regressions, and (3) the low

prevalence of having given informal care to a parent and/or spouse living in the household, which makes the variable of less policy relevance.[7]

---- TABLE 11 ABOUT HERE ----

Discussion

Informal-care provision apparently induces substantial opportunity costs in terms of reduced labour market-attachment. In our study, informal-care provision was associated with significant lower employment probability for both men and women. A similar result was obtained for hours worked, but only when analysing men and women together. We did not find any statistically significant wage-rate effects of informal-care provision, though. By and large, our findings confirm the results of previous studies. (Muurinen, 1986; Stone & Farley-Short, 1990; Boaz & Muller, 1992; Ettner, 1996; Pavalko & Artis, 1997; Johnson & Lo Sasso, 2000; Kolodinsky & Shirey, 2000; Pavalko, 2006) and UK (Arber & Ginn, 1995; Carmichael & Charles, 1998; Carmichael & Charles, 2003a; Heitmueller, 2004). To the best of our knowledge, our study is the first to have estimated the relationship outside the US and UK.

Our results further suggest that the relationship between informal-care provision and labour-market outcomes differ between the north, the central, and the south of Europe. Supplying informal care was found to decrease the probability of being employed for men and the number of hours worked for both men and women more in central Europe than in southern Europe. Moreover, informal care-giving was found to reduce the number of hours worked more for men in northern Europe than in southern Europe. One interpretation of these findings is that the adverse effects of informal care on labour-market outcomes are more severe in countries with weak family ties, where norms on family loyalties and intra-generational support also are weaker. In these countries, there may also, for instance, be less acceptance among employers and co-workers for employees who take time off or skip work in order to care for their elderly parents.

As regards the effect on the wage rate for women, the interaction between informal care and residing in central Europe was significant and positive, suggesting that the negative effect on wages of informal-care provision obtained for the southern group was actually positive in the former group. A positive interaction

effect was also obtained for women in the northern group, although the effect was only significant at the 10% level. The magnitude of the interaction effect suggested that the effect on wages among women in the northern group was close to zero.

The statistical inference behind these results may be disturbed if potential endogeneity of informal care is not taken into account in the estimates. However, we could not reject the null hypothesis of informal-care provision being exogenous in any of the IV-methods regressions. Thus, for our purposes it seems that the causality between informal-care provision and labour market outcomes can be considered to run mainly from the former to the latter. Moreover, the estimated effects are unlikely to be due to unobserved factors potentially affecting both care-giving and occupational status.

In order to fully understand the policy-implications of our results, some theoretical reasoning might be helpful.

First, the structure and timing of different decisions made by the individual and other actors, which determine labour-market outcomes, can be thought of as follows: given that (the amount of) informal care is exogenously given, and that all labour-market actors can observe it, we can imagine that this factor causes (1) the decisions taken by the individual of whether or not, and to what extent, to participate in the labour market, and (2) the content of any labour-market offer. The individual (potential) employees interact in this way with the employers in the labour market. The rules, which regulate this interaction and, hence, partly decide the outcomes, are set by governments. *Second*, let us go through this simple model and summarize the factors, which are potential contributors to the observed labour-market outcomes: (1) given a certain amount of informal-care provision, individuals may differ in their propensity to supply time to the labour market. The incentives for supplying labour-market time can be influenced by public-policy efforts aiming at informal care, for instance, by reimbursing time used for informal-care provision. Further, it is possible that individual preferences differ systematically between countries, and institutional settings; and (2) clearly labour- market offers will be determined by the legal structure regarding, for instance, what factors are legitimate for employers to consider when making offers to potential employees, and to what extent legal rules are enforced. Also, there may be rules for the qualitative content of any legitimate. Thus, not only formal institutional factors such as legal rules are important, but also informal factors such as preferences, norms, and traditions may be important.

It is certainly beyond the scope of this paper to give a comprehensive assessment of formal and informal institutions in the countries, which participated in the study. Just to give an example, however: Public policies for compensating informal-care providers for their loss of income, when taking time off work to supply informal care, vary to a great extent across Europe. In several European countries, the social insurance system compensates informal-care providers for their income losses accruing as a result of the provision. The generosity of these programmes varies, though: in France, for instance, 3 days per year are compensated, whereas in Italy, up to 25 days per day are compensated (Lamura, 2003). In France and Germany, benefits are means-tested, while this is not the case in Austria (Jenson and Jacobzone, 2000). Furthermore, in Austria, the recipient's labour-force participation is unrestricted and the recipient has complete control over the use of the received compensation. Conversely, in France, a family member may only be hired to provide informal care if he/she is unemployed and benefits must be used to buy services or pay salaries (Jenson and Jacobzone, 2000). Additionally, if an heir is hired to give informal care, the size of the future heritage (the estate) will affect the payment (Jenson and Jacobzone, 2000). Generally, payments are in the form of a short-term monetary benefit. However, long-term compensations do exist in the form of pension contributions in, for instance, Austria, France and Germany (Jenson and Jacobzone, 2000). Thus, combining informal-care provision and labour- market work may be more or less costly in different European countries.

So, there may be reasons for policy-makers to consider measures aimed at increasing the future supply of informal care. Due to demographic changes, the demand for both formal and informal care is likely to increase. At the same time, there are counteracting trends that are likely to decrease the supply of informal care. During the past decades, the average number of children per women has decreased in all European countries (Eurostat, 2005). Consequently, future generations will have a smaller network to rely upon regarding the provision of informal care. Moreover, increased participation of women in the labour market may further reduce the availability of informal care. Another trend, possibly affecting the supply of informal care, is the tendency in many European countries to raise their statutory retirement age (MISSOC, 1998). This means that an increasing number of people in their 60s will still be working and, thus, have less time to act as informal care-givers. In addition, factors such as lower marriage rates, greater geographic mobility, and

declines in intergenerational co-residence are factors contributing to changes in the supply of informal care over time, since most care-givers are spouses or children.

Our results suggest, though, that such policies may come with a large opportunity cost in the form of reduced labour supply among both male and female carers. Now, since the Lisbon Agenda declared that increased labour market participation, especially among women, is an important goal for Europe, this result should be taken into account when designing policies regarding informal care. Any policy single-handedly aimed at increasing the supply of informal care runs the risk of counteracting other policy goals.

If policies aimed at increasing the supply of informal care is not a policy option, due to its adverse labour-market effects, an alternative would be to substitute informal care with paid formal care in the home to a greater extent. Prior results on European data have suggested that informal care and formal care in the home may be substitutes for each other (Bolin et al., 2006). Such a policy would lessen the burden on informal care-givers and possibly increase labour-market participation, while still meeting some of the demands for care in the homes by frail elderly. It should be noted, though, that the provision of home care by the formal health- and social care system has been decreasing for quite some time in many European countries.

Increasing the burden on the formal health- or social care system, by expanding the provision of formal home-care services, may, however, not be a viable policy option in a Europe already facing increasing expenditures for health and social care due to population ageing and technological advancements. Policies aimed at increasing the provision of informal care with as low adverse labour-market effects as possible would certainly be preferable. This could be accomplished in several ways. More flexible work-hours might be such an option, allowing more flexibility for the caregiver in combining paid work and care-giving. Another might be increased possibilities of paid leave for caring for a dependent. Such polices are already in place in many countries but are usually quite limited in scope (Jenson and Jacobzone, 2000).

A few caveats are in order. Some potentially important variables were not available in the data set. For instance, the use of paid formal care in the home of the elderly parent could not be observed. As discussed in the introduction, a child whose time cost exceeds the price of formal homecare will decide to buy the latter, if available, rather than providing informal care by him/herself. The use of formal care

will, thus, be an unobserved third factor that is likely to be related to both care-giving and occupational attainment. Since we were unable to reject the hypothesis of informal care being exogenous in any of the regressions, however, it seems unlikely that the relationship between informal care and occupational attainment is driven mainly be this unobserved third factor.

Moreover, in some cases, IV-estimation could not be conducted. This was the case, when analysing men separately, as none of the instruments predicted care-giving in a significant manner. The latter result suggested that while factors such as parent's and, health, and distance to parents significantly affected the amount of care-giving among women, this was not the case among men. Consequently, we were unable to test the hypothesis of informal care being exogenous in the male sample.

It should also be remembered that the results in this study concerned those aged 50 and above. Certainly, some younger individuals, not in the data set, may already have left the labour market, in order to care for their elderly parents. This means that we may not observe the full effect of care-giving on labour market outcomes and that the effects obtained in this paper should be viewed as lower boundaries of the "true" effect.

It should be observed that explicitly addressing to what extent the effects of care-giving depend on specific policies and regulations was beyond the scope of this paper. With comparable information across all SHARE countries, analyses of the relationship between informal care and occupational attainment under alternative policies and regulatory frameworks might be conducted. To collect the relevant information to construct useful indicators is a challenging task, though. Thus, in order to take the analysis a step further, one should to begin with focus on a smaller number of countries.

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Table 1. Descriptive statistics on informal care.

	Weekly hours of informal care				Any informal care				Weekly hours of informal care given > 0			
Country	Males		Females		Males		Females		Males		Females	
	Mean	sd	Mean	sd	Mean	sd	Mean	sd	Mean	sd	Mean	sd
Germany	2.32	9.17	1.77	6.48	0.35	0.48	0.27	0.44	6.70	14.70	6.59	11.23
Austria	2.31	9.39	2.07	5.13	0.50	0.50	0.44	0.50	4.57	12.85	4.75	6.91
Sweden	0.87	1.75	1.28	3.39	0.53	0.50	0.53	0.50	1.65	2.12	2.43	4.36
Netherlands	2.18	12.18	2.64	5.38	0.58	0.49	0.55	0.50	3.76	15.84	4.80	6.50
Spain	0.40	2.30	1.36	9.53	0.11	0.31	0.12	0.32	3.76	6.35	11.72	26.46
Italy	1.08	6.00	3.97	14.92	0.22	0.41	0.26	0.44	4.99	12.25	15.38	26.38
France	1.25	4.21	1.50	3.71	0.41	0.49	0.40	0.49	3.02	6.15	3.74	5.12
Denmark	1.40	3.65	1.52	4.76	0.62	0.49	0.57	0.50	2.25	4.42	2.68	6.08
Greece	1.10	4.93	2.49	8.11	0.23	0.42	0.24	0.43	4.88	9.52	10.20	13.90
Switzerland	1.07	3.72	1.20	3.64	0.47	0.50	0.48	0.50	2.27	5.19	2.50	4.94
Total	1.50	7.20	2.09	7.38	0.42	0.49	0.40	0.49	3.59	10.83	5.25	10.96
n	1,718		2,079		1,718		2,079		715		828	

Table 2. Descriptive statistics on labour market outcomes.

	Employment				Weekly hours worked				Wage rate			
Country	Females		Males		Females		Males		Females		Males	
	Mean	sd	Mean	sd	Mean	sd	Mean	sd	Mean	sd	Mean	sd
Germany	0.32	0.47	0.52	0.50	30.89	10.81	41.12	16.62	15.58	14.88	22.61	36.47
Austria	0.52	0.50	0.68	0.47	29.58	10.84	38.26	10.06	14.86	9.06	25.08	50.15
Sweden	0.75	0.43	0.84	0.37	34.91	9.09	39.86	5.80	14.57	5.02	19.17	13.19
Netherlands	0.44	0.50	0.68	0.47	24.29	9.92	35.49	6.97	23.26	36.97	24.58	32.56
Spain	0.29	0.45	0.56	0.50	33.13	10.02	38.23	10.38	9.39	6.11	13.42	15.15
Italy	0.25	0.44	0.50	0.50	30.53	9.89	36.17	10.09	13.42	8.04	18.18	14.97
France	0.53	0.50	0.59	0.49	31.19	8.70	36.47	9.17	18.79	41.41	19.74	14.93
Denmark	0.69	0.47	0.75	0.44	33.39	10.25	37.94	8.23	21.60	22.35	24.37	9.88
Greece	0.31	0.46	0.79	0.41	33.95	10.64	38.29	9.58	11.13	10.38	11.38	8.39
Switzerland	0.61	0.49	0.80	0.40	28.85	13.68	40.26	18.16	34.89	64.26	28.72	14.03
Total	0.47	0.50	0.67	0.47	31.01	10.73	38.00	10.15	18.28	27.92	21.30	27.21
n	2,079		1,718		900		895		879		876	

Table 3. Descriptive statistics

		Mean	sd
Dependent variables			
Employed	1 if employed	0.56	0.50
Log of contracted hours[a]	Log(1+contracted weekly hours worked)	3.50	0.41
Log of hourly wage rate[a]	Log(1+hourly wage rate)	2.80	0.60
Independent variables			
Log of informal care	Log(1+weekly hours of informal care)	0.44	0.81
Age	Age in years	55.29	3.98
Age squared	Age^2	3072.72	448.11
Female	1 if female	0.55	0.50
Years of education	Total number of years of education	11.46	3.99
Wealth	Net wealth in Euro (1,000)	290.91	510.21
Married	1 if married	0.77	0.42
Country of birth	1 if born in country where the interview took place	0.92	0.26
Number of children	Total number of children	2.08	1.26
Self-reported bad health	1 if bad or very bad self-reported health	0.13	0.33
Number of health conditions	Number of health conditions out of 14 listed	1.00	1.14
Public sector[a]	1 if working in the public sector	0.29	0.45
Part-time[a]	1 if working part-time (20 hours or less per week)	0.14	0.35
Denmark		0.09	0.29
Germany		0.14	0.34
Netherlands		0.15	0.35
France		0.09	0.28
Austria		0.09	0.28
Switzerland		0.05	0.21
Italy		0.11	0.31
Spain		0.07	0.25
Greece		0.11	0.31
Informal care to parent in household	1 if having given informal to a parent living in the household	0.02	0.13

Instruments			
Mother have bad health[b]	1 if the child reports that mother's health is bad or very bad	0.05	0.22
Father have bad health[b]	1 if the child reports that father's health is bad or very bad	0.05	0.22
Age of mother[b]	Mother's age in years	81.62	5.85
Age of father[b]	Father's age in years	82.34	5.50
Mother lives far away[b]	1 if mother lives more than 100 km away	0.38	0.49
Father lives far away[b]	1 if father lives more than 100 km away	0.38	0.49
Mother deceased	1 if mother is deceased	0.12	0.33
Father deceased	1 if father is deceased	0.64	0.48
Number of siblings	Total numbers of alive siblings	0.91	0.29

[a] Mean is for those being employed.

[b] Mean is for those having a mother/father alive.

Table 4. Regressions on employment probability. Marginal effects. Probit model.

	Full sample	Women	Men
Hours of informal care	-0.037**	-0.028+	-0.032+
	(0.012)	(0.015)	(0.018)
Wealth	0.000**	0.000	0.000**
	(0.000)	(0.000)	(0.000)
Age	0.421**	0.397**	0.358**
	(0.072)	(0.098)	(0.096)
Age in square	-0.004**	-0.004**	-0.004**
	(0.001)	(0.001)	(0.001)
Female	-0.235**		
	(0.018)		
Years of education	0.026**	0.030**	0.015**
	(0.003)	(0.004)	(0.004)
Married	-0.011	-0.070*	0.070*
	(0.023)	(0.030)	(0.034)
Born in country of residence	0.064+	-0.025	0.178**
	(0.037)	(0.046)	(0.056)
Number of children	-0.002	-0.019+	0.014
	(0.008)	(0.010)	(0.010)
Bad or very bad self-reported health	-0.259**	-0.180**	-0.357**
	(0.030)	(0.039)	(0.046)
Number of health conditions	-0.039**	-0.042**	-0.031*
	(0.009)	(0.012)	(0.013)
Denmark	-0.211**	-0.180**	-0.185**
	(0.043)	(0.050)	(0.066)
Germany	-0.342**	-0.348**	-0.224**
	(0.035)	(0.035)	(0.062)
Netherlands	-0.356**	-0.374**	-0.230**
	(0.033)	(0.033)	(0.057)
France	-0.270**	-0.223**	-0.291**
	(0.041)	(0.047)	(0.062)
Austria	-0.448**	-0.415**	-0.410**
	(0.029)	(0.027)	(0.056)
Switzerland	-0.217**	-0.268**	-0.079
	(0.050)	(0.048)	(0.084)
Italy	-0.423**	-0.410**	-0.345**
	(0.031)	(0.029)	(0.060)
Spain	-0.370**	-0.362**	-0.277**
	(0.038)	(0.036)	(0.073)

Greece	-0.367**	-0.432**	-0.125+
	(0.035)	(0.026)	(0.066)
Observations	3769	2070	1699

Robust standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 5. Effects of giving informal care on employment. Informal care treated as an endogenous variable. Instrumental variables probit regression. Marginal effects.

	Full sample	Women	Men*
Informal care	-0.224	-0.158	-
	(0.137)	(0.131)	-
F-test of first-stage instruments (p-value of null of jointly = 0)	9.24 ($p < 0.01$)	8.53 ($p < 0.01$)	-
Overidentification test, (p-value of null of valid exclusion restrictions)	1.15 ($p = 0.56$)	1.50 ($p = 0.47$)	-
Smith-Blundell exogeneity test, (p-value of null of exogeneity)	1.99 ($p = 0.16$)	1.04 ($p = 0.31$)	-

* For the full sample and for the sample of women we used the following instrumentents: mother lives more than 100 km away, mother's age, and father has bad health. In the case of men, none of the instruments significantly predicted informal care in the first-stage regression, thus preventing IV-estimation.

Table 6. Regressions on hours worked. OLS.

	Full sample	Women	Men
Hours of informal care	-0.026*	-0.030	-0.010
	(0.013)	(0.019)	(0.014)
Wage rate	-0.039*	-0.025	-0.062*
	(0.020)	(0.030)	(0.025)
Wealth	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Age	0.146	0.030	0.235
	(0.103)	(0.153)	(0.143)
Age in square	-0.001	-0.000	-0.002+
	(0.001)	(0.001)	(0.001)
Female	-0.266**		
	(0.020)		
Years of education	0.005	0.011*	0.001
	(0.003)	(0.005)	(0.004)
Married	-0.067**	-0.121**	0.006
	(0.020)	(0.032)	(0.023)
Born in country of residence	-0.010	-0.048	0.039
	(0.036)	(0.049)	(0.056)
Number of children	-0.014+	-0.001	-0.026**
	(0.008)	(0.012)	(0.010)
Public sector	0.036+	0.051	-0.009
	(0.021)	(0.033)	(0.023)
Bad or very bad self-reported health	-0.057	-0.079	-0.031
	(0.039)	(0.062)	(0.044)
Number of health conditions	-0.004	-0.000	-0.011
	(0.010)	(0.015)	(0.013)
Denmark	-0.078*	-0.095+	-0.065+
	(0.032)	(0.049)	(0.037)
Germany	-0.188**	-0.252**	-0.116**
	(0.036)	(0.057)	(0.037)
Netherlands	-0.279**	-0.429**	-0.138**
	(0.031)	(0.055)	(0.026)
France	-0.130**	-0.111+	-0.146**
	(0.035)	(0.059)	(0.034)
Austria	-0.118**	-0.209**	-0.045
	(0.039)	(0.069)	(0.032)
Switzerland	-0.214**	-0.334**	-0.082
	(0.062)	(0.085)	(0.089)

Italy	-0.163**	-0.127+	-0.187**
	(0.045)	(0.068)	(0.058)
Spain	-0.118*	-0.096	-0.133+
	(0.059)	(0.094)	(0.073)
Greece	-0.108**	-0.052	-0.131**
	(0.041)	(0.079)	(0.041)
Constant	0.247	3.234	-2.284
	(2.804)	(4.150)	(3.879)
Observations	1780	897	883
R-squared	0.16	0.13	0.07

Robust standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 7. Effects of giving informal care on hours worked. Informal care treated as an endogenous variable. 2SLS.*

	Full sample	Women	Men
Informal care	0.078	0.138	-0.110
	(0.141)	(0.159)	(0.282)
F-test of first-stage instruments (p-value of null of jointly = 0)	7.44 (p < 0.01)	6.75 (p < 0.01)	2.91 (p = 0.09)
Overidentification test, Sargan statistic (p-value of null of valid exclusion restrictions)	0.05 (p = 0.83)	1.85 (p = 0.17)	-
Durbin-Wu-Hausman exogeneity test, (p-value of null of exogeneity)	0.57 (p = 0.45)	1.25 (p = 0.26)	0.13 (p = 0.72)

* For the full sample, we used two variables indicating whether or not having a father with bad health and whether or not having a mother living more than 100 km away as instruments. When analysing women separately, two variables indicating whether or not having a father with bad health and whether or not having a father living more than 100 km away were used as instruments. For men, only the variable indicating whether or not having a mother living more than 100 km away was used as instrument.

Table 8. Regressions on wage rate. OLS.

	Full sample	Women	Men
Hours of informal care	0.008	0.022	-0.006
	(0.019)	(0.029)	(0.026)
Wealth	0.000**	0.000**	0.000*
	(0.000)	(0.000)	(0.000)
Age	0.126	0.126	0.143
	(0.119)	(0.147)	(0.179)
Age square	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.002)
Female	-0.178**		
	(0.026)		
Years of education	0.053**	0.051**	0.056**
	(0.004)	(0.005)	(0.006)
Married	0.017	-0.033	0.087+
	(0.028)	(0.037)	(0.045)
Born in country of residence	0.068	0.047	0.113
	(0.051)	(0.047)	(0.105)
Number of children	0.008	0.005	0.008
	(0.010)	(0.014)	(0.014)
Public sector	-0.043	-0.022	-0.069+
	(0.029)	(0.043)	(0.041)
Part-time work	0.042	0.026	0.117
	(0.049)	(0.054)	(0.117)
Bad or very bad self-reported health	-0.085+	-0.123*	-0.052
	(0.051)	(0.058)	(0.089)
Number of health conditions	-0.010	-0.008	-0.013
	(0.015)	(0.022)	(0.019)
Denmark	0.146**	0.161**	0.109*
	(0.039)	(0.057)	(0.055)
Germany	-0.206**	-0.211**	-0.202**
	(0.046)	(0.056)	(0.075)
Netherlands	0.077+	0.096	0.047
	(0.040)	(0.062)	(0.054)
France	0.048	0.079	0.004
	(0.047)	(0.069)	(0.063)
Austria	-0.180**	-0.174*	-0.209*
	(0.060)	(0.080)	(0.093)
Switzerland	0.366**	0.360**	0.363**
	(0.065)	(0.099)	(0.084)

Italy	-0.153**	-0.184**	-0.140
	(0.058)	(0.070)	(0.090)
Spain	-0.351**	-0.315**	-0.404**
	(0.067)	(0.090)	(0.096)
Greece	-0.523**	-0.450**	-0.587**
	(0.058)	(0.108)	(0.070)
Constant	-1.301	-1.380	-1.921
	(3.265)	(4.058)	(4.923)
Observations	1742	876	866
R-squared	0.28	0.26	0.29

Robust standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 9. Effects of giving informal care on the wage rate. Informal care treated as an endogenous variable. 2SLS.

	Full sample	Women	Men*
Informal care	-0.258	-0.098	-
	(0.194)	(0.177)	-
F-test of first-stage instruments (p-value of null of jointly = 0)	5.26 ($p < 0.01$)	7.40 ($p < 0.01$)	-
Overidentification test, Sargan statistic (p-value of null of valid exclusion restrictions)	0.69 ($p = 0.71$)	0.04 ($p = 0.83$)	-
Durbin-Wu-Hausman exogeneity test, (p-value of null of exogeneity)	2.13 ($p = 0.14$)	0.49 ($p = 0.49$)	-

* In the case of men, none of the instruments predicted informal care in the first-stage regression, thus preventing IV-estimation.

Table 10. Interaction terms. Effects of informal care employment, hours worked, and wages. OLS coefficients (se).

	Employment			Hours worked			Wages		
Interactions	Full sample	Women	Men	Full sample	Women	Men	Full sample	Women	Men
Hours* Central	0.037 (0.027)	-0.009 (0.034)	-0.124* (0.052)	-0.098** (0.030)	-0.102* (0.046)	-0.087** (0.032)	0.036 (0.051)	0.143* (0.061)	-0.075 (0.073)
Hours* Nordic	0.018 (0.039)	0.017 (0.047)	-0.054 (0.065)	-0.052 (0.032)	-0.033 (0.048)	-0.079* (0.034)	0.027 (0.049)	0.087+ (0.051)	-0.029 (0.085)
Hours of informal care	-0.021 (0.023)	-0.028 (0.028)	0.054 (0.048)	0.039+ (0.023)	0.026 (0.036)	0.058* (0.025)	-0.023 (0.042)	-0.080* (0.041)	0.038 (0.065)
Central	0.076** (0.024)	0.142** (0.033)	0.022 (0.033)	-0.027 (0.030)	-0.130** (0.048)	0.062 (0.038)	0.345** (0.043)	0.267** (0.064)	0.417** (0.057)
Nordic	0.282 (0.027)	0.419** (0.036)	0.130** (0.038)	0.122** (0.034)	0.086 (0.055)	0.144** (0.042)	0.414 (0.043)	0.354** (0.064)	0.473** (0.060)

Robust standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 11. Sensitivity analysis. Effects of giving informal care to (1) a parent outside the household, (2) a parent living in the household, (3) a spouse living in the household on employment, hours worked, and the wage rate.

	Full sample	Women	Men
Employment			
Informal care to a parent outside household	-0.038**	-0.028+	-0.032+
	(0.012)	(0.015)	(0.018)
Informal care to a parent living in household	-0.215**	-0.186*	-0.235+
	(0.069)	(0.072)	(0.126)
Informal care to a parent living in household	-0.030	0.013	-0.043
	(0.074)	(0.094)	(0.106)
Hours worked			
Informal care to a parent outside household	-0.027*	-0.030	-0.011
	(0.013)	(0.019)	(0.014)
Informal care to a parent living in household	-0.125	-0.035	-0.207
	(0.116)	(0.131)	(0.183)
Informal care to a parent living in household	0.041	-0.030	0.118*
	(0.075)	(0.133)	(0.051)
Wage rate			
Informal care to a parent outside household	0.009	0.023	-0.006
	(0.019)	(0.029)	(0.026)
Informal care to a parent living in household	-0.001	-0.146	0.153
	(0.150)	(0.114)	(0.292)

Informal care to a parent living in household	-0.095	-0.146+	-0.038
	(0.058)	(0.078)	(0.088)

Robust standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Notes

[1] Reher (1998) argues that the Muslim domination in Southern Europe emphasized vertical relationships between generations, where children's care of their parents in old age and intra-generational co-residence are seen as a manifestation of a "strong family". The Reformation and Germanic tradition in Northern Europe instead, according to Reher (1998) contributed to the development of a weak family characterized by people who do not rely on the children in old age and as youths detach themselves from their parents at relatively early ages.

[2] Wealth refers to *net household wealth*. The variable is derived by the SHARE team and includes, among other things value of primary residence, other residence, bank accounts, stock holdings, mortages, individual retirement accounts, etc. For a detailed description, see Börsch-Supan and Jürges (2005), p. 114.

[3] The conditions considered were (1) heart attack, including myocardial infarction or coronary thrombosis or any other heart problem including congestive heart failure, (2) high blood pressure or hypertension, (3) high blood cholesterol, (4) a stroke or cerebral vascular disease, (5) diabetes or high blood sugar, (6) chronic lung disease such as chronic bronchitis or emphysema, (7) asthma, (8) arthritis including osteoarthritis or rheumatism, (9) osteoporosis, (10) cancer or malignant tumour including leukaemia or lymphoma but excluding minor skin cancers, (11) stomach or duodenal peptic ulcer, (12) Parkinson disease, (13) cataracts, (14) hip fractures or femoral fracture.

[4] As noted by an anonymeous referee, however, people may move to find a job, which may also increase the distance to their parents. Some caution should therefore be taken when interpreting the results using this instrument.

[5] When conducting instrumental-variables regressions, our choice of method was dependent on the nature of the dependent variable. In cases where the dependent variable was continuous, i.e. in the hours-worked- and wage equations, we used 2SLS regression. In cases where the dependent variable was dichotomous, i.e. in the employment equation, we used the Amemiya Generalized Least Squares (AGLS) estimator, which estimates a probit model with a continuous endogenous explanatory variable. The computations were performed using the IVPROB programme in STATA, which provides asymptotically efficient standard errors. In the first-stage regression. the endogenous explanatory variable is treated as a linear function of the instruments and the exogenous variables. In the second stage, the prediction from the first stage is included as an explanatory variable in the main equation. For a descriptions of the AGLS estimator, see Maddala (1983) pp. 247-252.

[6] Full results are available on request.

[7] It should be noted that we are unable to adress any potential endogeneity of informal care-giving within the household. The reason is a lack of appropriate instruments. Some caution should therefore be exercised in interpreting these results.