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And Thou Shalt Honor: children's caregiving, work and religion

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And Thou Shalt Honor: children's caregiving, work and religion

Fernanda Mazzotta[§], Francesca Bettio[°] and Valentina Zigante⁺¹

Abstract

In this paper we take a fresh look at the magnitude of the trade-off between caring informally for a parent and paid work. We adopt a simultaneous approach with a primary focus on how hours of care are influenced by hours of work rather than the other way round. We also investigate the role that filial obligations play in choices of caring versus working. Using the SHARE data (2004 and 2006) we find that the elasticity of informal care hours in response to working hours is around -0.18, small but not negligible. Moreover, we find that a one point decrease out of a seven point index measuring the strength of filial obligations reduces weekly hours of care by about one hour and half.

Jel. I11; I12; J22, D10, Z10

Key words: Informal care; caregiver, culture; endogeneity; Europe; SHARE

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1. Motivation, questions and focus

Demographic and economic processes currently under way in Europe underscore the unceasing importance of analyzing the provision of informal care in relation to paid work. As a combined result of these processes, trends in the supply and demand of informal care may diverge. On the demand side, progressive ageing is exerting additional pressure on health and long-term care systems while fiscal constraints are limiting the supply of formal care services. On the supply side, ongoing efforts to postpone the official age of retirement in several European countries increase the likelihood of being in employment at the stage in life when the prospect of having to provide care to parents or parents-in-law often becomes a binding constraint. In particular, care provided by children to parents may be declining due to decreases in family size and rising childlessness among future cohorts of older people (Hantrais, 2006; OECD, 2011) less frequent co-residence of older people with their children (Grundy, 2010; Ruggles, 2009), and the continuing expansion of women's employment (Bettio & Verashchagina, 2012). For example, Pickard (2008) estimated for the UK a threefold increase in demand for eldercare compared to supply by adult children between 2005 and 2041, with 90 percent of the supply provided by people under 65 years of age. This calls for reconsidering the potential conflict between caring and working, especially among adult children.

Although research in English investigating the trade-off between informal care and work is still biased in favour of Anglophone countries², in the past ten years a number of comparative studies have been carried out on subgroups of European countries (Bickel et al., 2001; Bolin, Lindgren, & Lundborg, 2008; Brugiavini, Buia, Pasini, & Zantomio, 2013; Casado-Marín, García-Gómez, & López-Nicolás, 2010; Costa-Font, 2010; Crespo & Mira, 2014; Jiménez-Martín & Vilaplana Prieto, 2015; Kotsadam, 2011; Meng, 2013; Pagani & Marenzi, 2008; Viitanen, 2010). With a few exceptions - to which we shall return later – these papers and the broader literature on the intersection between informal care and work tend to neglect a set of factors that may mitigate or exacerbate the conflict, namely cultural attitudes and beliefs about employment and caregiving. This scant attention to the role of cultural factors is especially regrettable in the case of Europe, where marked cultural heterogeneity exists between as well as within countries. European countries offer, in fact, an ideal testing ground for the impact of cultural influences on economic outcomes.

In this paper we take a fresh look at the still topical question of the magnitude of the trade-off between caring for a parent or an in-law and paid work. We adopt a simultaneous approach that builds on the one presented by Wolf and Soldo (1994), but we expand the model and add to the existing literature in two respects. We adapt the original model to focus on the intensive margin of choices of informal caregiving. Our primary focus is on how hours of care are influenced by hours of work, whereas the overwhelming majority of studies in the literature consider the relationship in reverse. We also expand the model to investigate the role that filial

² Lilly et al. (2007), as well as Bauer & Souza-Posa (2015), conduct systematic reviews of the relevant literature in English for all countries. We shall return to these reviews later in the discussion.

obligations play in choices of caring versus working. In fact, our choice of focusing on the care/work nexus rather than the converse is partly justified by the expectation that filial obligations exert a stronger influence on decisions about caregiving than on decisions about working.

From a methodological perspective, our purpose is to investigate the issue of endogeneity between caregiving and working, partly in response to recent evidence which questions endogeneity in the case of Europe (Bolin et al., 2008; Kotsadam, 2011 in particular). The structural approach that we adopt - which is not common in comparative studies - explicitly assumes a two way causal relationship between caregiving and working. We test this assumption against alternative specifications and conclude that we cannot rule it out.

The caregivers in our sample are children from nine European countries (Belgium, Denmark, Germany, Greece, the Netherlands, Italy, Spain, Sweden and Switzerland), allowing us to exploit cultural heterogeneity within Europe as well as among men and women. The children considered are from 'midlife households' and they might give care to non-cohabiting parents on a daily basis ('external' care for short). Limiting the analysis to external care is the only choice if the objective is to investigate the intensive margin of the trade-off between working and caregiving. This is because the SHARE survey is the only European survey to record hours of care provided to the elderly, but such information is only available for external care.³ We also limit the analysis to high-intensity caregiving rather than any amount of caregiving. In their systematic review of quantitative research on participation, hours of work and hours of care (to the elderly), Lilly et al. (2007) concluded that evidence of a conflict between caring and working is strong when care intensity is high, while it is much more uncertain in the case of light care commitments.

We chose to study children rather than spouses or other family members because children typically care for parents living outside the household, whereas spouses typically care for their partner within the household, and other family members are a small minority among 'external' caregivers. There are also conceptual reasons for focusing on the child/parent dyad. The attitudes towards family obligations that we wanted to explore are often specific to dyadic relationships such as those between children and parents. We considered children of both sexes: informal care given by adult male children to their parents or spouses is becoming increasingly important, although women continue to be disproportionately involved (Bettio & Verashchagina, 2009: Figure 13).

Our main findings are that hours of work negatively and significantly impact on hours of care: the value of the associated elasticity is -0.18. Although there is no relevant benchmark in the literature, we argue that this is a small but not negligible impact. We also find an appreciable impact of perceived filial obligations on the supply of informal care hours: an increase of the filial obligation score construct by one point expands weekly average

³ Several surveys choose not to collect data on hours of informal care devoted to cohabiting family members due to a high incidence of large measurement errors.

hours of informal care by about one hour and half. On a methodological level, we find that selectivity is a problem when estimating hours of care and that endogeneity between hours of care and hours of work cannot be rejected.

The paper is organized as follows: section 2 sets out our theoretical approach, followed by a discussion of the main findings from previous empirical work in section 3. Section 4 discusses the econometric strategy and presents the data. Section 5 discusses the findings, while section 6 concludes.

2. Theoretical framework

Following Wolf and Soldo (1994), we anchored our empirical investigation to a standard utility maximizing model where children make choices about working and caring so as to maximize their own utility (subject to time and income/price constraints). Wolf and Soldo assume that decisions about caregiving and employment are taken simultaneously, and they formally outline the decision process of a potential (child) caregiver by expanding the standard, individual labour supply model. The health and care needs of the parent(s) feature in the child's utility function together with a mutually exclusive option to provide informal care or to outsource care; prices of outsourced services feature in the budget constraint. Wolf and Soldo stop short of explicitly modelling possible interactions among child, parent(s) and other family members in order to avoid the formal complexities that this would involve.

By explicit admission of Wolf and Soldo (1994), therefore, their model is not a household bargaining model where individual family members behave as game-theory players and may engage in strategic interactions⁴. In principle the bargaining approach is theoretically appealing for the kind of questions that this paper investigates (Hiedemann & Stern, 1999; Pezzin & Schone, 1999). It allows for strategic interactions and for conflict of interest among family members - e.g. a brother's decision to care for his parents may depend on expectations about his sister's commitment to caregiving. The approach can also accommodate the influence of social norms, beliefs and filial/parental obligations more easily than New Household Economics models (Lundenberg, 2008). However, accounting for strategic interactions tends to require complex analytical structures. Complexity is likely to increase further in a multi-country context like the one that we consider, since interactions among family members tend to differ across countries for cultural, institutional and demographic reasons. The bargaining approach can also be very demanding in terms of data. For example, it

⁴ One may dispute whether the model should be classified 'unitary' as Michaud and Heitmuller (2010) assert or whether it falls within the broader category of 'New Household Models'. In unitary household models a 'benevolent dictator' ensures that household members' decisions are consistent with the maximization of the common utility function. By contrast, New Households Models such as Becker's theory of allocation of time (1965) need not exclude maximization of individual utility by separate members, e.g. when the wife chooses whether to work or not, taking her husband's work income as given.

requires information about family members, whereas surveys typically report data about household members. For all these reasons we control for possible strategic interactions in our econometric specifications, e.g. arising from the presence of siblings, but stop short of explicitly adopting a bargaining framework.

As said, we are interested in the role that specific beliefs about intergenerational family obligations exercise on employment and caregiving behavior. Beliefs, motivations and preferences – ‘culture’ for short – are increasingly investigated by economists (see Alesina & Giuliano, 2015 for a recent survey). However, most research in this area is applied, perhaps because of the widespread view that there is no need to modify the standard economic models in order to incorporate culture (Fernandez, 2010). The emphasis is instead on selecting the appropriate empirical approach and specification. This includes choosing variables to capture the impact of beliefs or motivations, choosing the appropriate econometric methodology to allow for two-way causation between culture and economic outcomes and to separate out the influence of culture and of institutional factors from that of economic processes. We follow the applied approach in this paper, although this is not to endorse the view that economic models need not change to make room for culture. We treat attitudes about family obligations and religious beliefs as sources of individual heterogeneity. This is the view taken by Elster (1989), among others. Elster understands social norms and culture as grounded in emotional and behavioural propensities of individuals which ‘go social’ because they are shared by other people and supported or ostracized by their approval or disapproval. In Elster’s work, familial obligations may fit different categories of norms. For example, they may feature as ‘*cooperation norms*’ geared to maximizing cooperation in situations where cooperation is a superior alternative for everybody involved; or they may feature as *norms of reciprocity* which urge the reciprocation of favours received from others.

The fundamental relations investigated in what follows, and the variables involved, can be summarized as follows:

$$h^e = \kappa (h^{ic}, X^e, FOS)$$

$$h^{ic} = \tau (h^e, X^c, FOS)$$

$$FOS = \upsilon (h^{ic}, Z)$$

where h^e = supplied hours of paid work, h^{ic} = supplied hours of informal care, X^e and X^c stand for (partially overlapping) vectors of individual, family and institutional characteristics influencing time allocation decisions, FOS (Familial Obligations Score) is an indicator of normative attitudes towards family obligations that may be influenced by time allocation variables, on the one hand, and by vector Z of (exogenous) cultural factors and institutional factors on the other. The variables are discussed in greater detail in section 4.3 below.

3. Taking stock of empirical investigations

Both the New Household Model and the Bargaining Model predict that informal care is inversely related to paid work unless care services are ‘outsourced’. In order to contextualize our estimation strategy as well as

our findings, in this section we first take stock of what we learnt from empirical research on the potential trade-off between working and caring, and then examine selected evidence on the importance of related cultural motivations.

3.1 Working and caregiving

Our task in reviewing the literature on the care/work nexus is greatly facilitated by two meta-studies published in the past ten years, respectively by Lilly et al. (2007) and by Bauer and Sousa-Poza (2015). Lilly et al. systematically review articles published in English between 1986 and 2006, providing evidence on the impact of informal caregiving on caregivers' labor market outcomes; participation, hours of work and wages. Thirteen data bases were searched from across different disciplines; economics, health services research, social work, gerontology, nursing, and gender studies. The 42 articles retained for the meta-study presented quantitative empirical work on the probability of labour market participation, hours of work, or wages.

Two of the conclusions reached by the study are of interest to us. The first is that no consistent evidence emerges across studies that the labour force participation of caregivers is lower than that of non-caregivers when the following conditions hold:

- i) only extensive caregiving is considered
- ii) differences between the two groups in observable demographic and social characteristics are adequately controlled for, especially age, education and motherhood status. This is necessary in order to avoid imputing low labour force participation to caregiving when at least part of the problem stems from low education, age, motherhood status, or other factors
- iii) the selection bias is controlled for. The bias arises from the possibility that caregivers self-select themselves into non-employment independently of caring commitments. In other words, caregivers' personal attributes, not easily observed, (for example socialisation to care work, undisclosed health issues, low expected wage) may reduce their probability of employment independently of caregiving status.

However, when condition (i) is dropped and the focus is on intensive caregiving, the conflict with employment is apparent even if observable and unobservable characteristics are controlled for. Specifically, intensive caregiving entails reductions in hours worked, although the size of the reduction varies considerably, from "almost negligible" (Rachel F. Boaz & Muller, 1992; R F Boaz, 1996) to six fewer hours of labour market work per week for each additional hour of caregiving (Lilly et al., 2007: 31; Mutschler, 1993)

The meta study by Bauer & Souza-Posa (2015) complements that by Lilly et al. by covering research published between 2003 and 2013. Seventeen of the studies reviewed specifically address the informal care and employment nexus in EU countries, with five of them using European surveys (ECHP or SHARE). The conclusions that the reviewers reach are less straightforward than those of Lilly et al. but broadly in agreement:

“... Whereas most studies report a negative link between care and employment, some relate a reduction in employment or work hours only to specific characteristics, with female co-residing caregivers being the most affected. The magnitude of these effects, however, appears rather small: caregivers seem to have a lower attachment to the labour force even before they enter the caregiver role. Likewise, the probability of informal caregivers being employed is at most 5–10% lower than that for non caregivers. Stronger effects could be obtained for very intense caregiving, which is provided primarily by females of working age, who are less likely to be fully employed and earn generally lower wages.” (Bauer & Sousa-Poza, 2015: 140)

As the excerpts from the two meta studies make clear, past research was chiefly preoccupied with the possible effects of caregiving on employment. The reverse effect was seldom investigated apart from a few exceptions, among them Stern (1995) for the USA and, more recently, Carmichael et al. (2010) for the UK and van Gameren & Naranjo (2015) for Mexico. All of them, however, investigated the probability of giving informal care rather than the amount of care hours being provided (though some distinguished levels of care hours). Two concluded that being in (paid) work has no significant effect on children’s probability of taking care of their elderly parent (Stern; van Gameren & Naranjo). Exploiting 15 waves of the British Household Survey, Carmichael et al. found, in contrast, that being employed reduces the odds of a woman providing care for 20 or more hours, relative to remaining a non-carer, by a factor of 0.559 and the odds of providing co-residential care by a factor of 0.568. The reduction is weaker for male caregivers, unless they co-reside (Carmichael et al., 2010:189). Such contrasting findings add to the reasons for investigating the intensive margin, namely hours of care in response to hours of work, as we do in this paper.

With regard to econometric specification, the issues of self-selection (into work or into caring) and that of endogeneity remain contentious in the literature on the caregiving/employment trade-off. In formal modelling, it is common to assume that decisions about employment and caregiving are interdependent because they are taken simultaneously or strategically. Interdependence has often been sidestepped in actual estimations because of econometric or data difficulties rather than on conceptual grounds, although there are also conceptual reasons to query the simultaneity assumption – e.g. uncertainty as to when care needs may arise and how strong they will be. The well-known risk of ignoring interdependence is that estimates are distorted by endogeneity bias. Endogeneity may also arise due to self-selection into caregiving (or working) status, e.g. as a result of early age socialization into caring roles. Or it may arise on account of measurement errors for hours of work or of care. However, some of the recent literature has queried the cogency of endogeneity, especially in relation to European countries.⁵

⁵ Exploiting the longitudinal structure of the European Countries Household Panel (ECHP), for example, Spiess and Schneider (2003) examine transitions in order to side-step the issue of simultaneity of decisions, but they also test for and rule out endogeneity due to self-selection⁵. Bolin et al.(2008) investigate the work/caregiving trade-off for SHARE countries, test the assumption of independence between the two decisions and are unable to reject exogeneity of hours of care. Kotsadam (2011) discusses endogeneity by means of an extensive review of the findings from the literature on this point and concludes that the issue is not of primary importance. In contrast, the evidence offered by Crespo and Mira (2014) and by Michaud et al.(2010) lends support to the assumption of endogeneity, respectively for 11 SHARE countries and for the UK. So does Heitmueller (2007), again for the UK, and more recently Casado et al. (2010) for Spain.

3.2 Culture, work and caregiving

Accounting for the influence of cultural heterogeneity on caregiving behaviour entails its own estimation challenges. As with the empirical literature on the caregiving-employment conflict, the issue of endogeneity between culture and economic outcomes and how to correct for it is a constant topic within the rapidly evolving field of cultural economics. To date, however, the attention of economists has been largely focused on employment and fertility outcomes in response to cultural determinants, while research exploring the response of caring behaviour is in its infancy.

Within the former strand of literature, strategies to deal with endogeneity differ. For example, Fernandez and Fogli (2009) resort to what they call an ‘epidemiological approach’, i.e. observation of second-generation immigrants in order to mitigate endogeneity of cultural beliefs and preferences with respect to employment choices among women. Guiso et al. (2003) use religion variables (religious affiliation and practice) to instrument differences in attitudes across countries and test the influence of the latter on economic outcomes. While they find that attitudes matter, they leave open the question of whether their findings can be given a causal interpretation; Yet their choice has inspired many followers. Fernandez (2010) is critical of Guiso et al.’s strategy, but she acknowledges that using religion as an instrument may be more appropriate if individual level data as opposed to country aggregates are used.

One contentious issue among the contributions that use religion to proxy or instrument culture is which matters most: religious affiliation or intensity of religious practice. The findings are mixed, though they are tilted in favour of a stronger influence exercised by intensity. In particular, Knudsen and Waerness (2001), Sjoberg (2004), and H’madoun (2010) find that, rather than type of religion, attendance at religious services or other measures of actual devoutness hinder female employment. In contrast, Pastore and Tenaglia (2013) find that two religious denominations – Muslim and Orthodox Catholic – exert a clear restraining influence on female labour market participation across all levels of devoutness, while intensity of practice and not denomination matters for other religions. However, Blau and Khan (2012) report mixed effects of religious denominations on female labour supply.

To our knowledge, Brugiavini et al. (2013) and Costa-Font (2010) have published the only other contributions (in English) addressing the culture/care (of the elderly) nexus in the European context. Costa-Font investigates whether formal care of the elderly is crowded out by strong family ties. In order to gauge the strength of family ties, he uses expectations to be able to rely on (or to be asked to provide) informal care from children in combination with a measure of residence proximity between children and parents. He finds a negative association between strong ties and coverage of formal long-term care facilities, which, he argues, can be taken as preliminary evidence of a causal link thanks to the identification strategy that he adopts. Brugiavini et al. use the drop-off questions from the SHARE 2004 and 2006 waves to construct an index of mutual obligation attitudes between parents and children. They test whether family obligations are actually reciprocal and find

that expectations about future caregiving from children do not significantly influence parents' caregiving.⁶ The two studies thus seem to yield opposite implications on the potential influence of family attitudes on caregivers' decisions, but Brugiavini et al. sidestep the issue of possible endogeneity of cultural attitudes.

Like Brugiavini and co-authors, we used the SHARE survey to construct a score of family obligations. However, we explicitly hypothesized that the strength of family obligations measured by our score and the informal care effort influence one another. One important reason, in our view, is that preferences about caring tend to be reinforced by the experience of caring, especially when high intensity care is provided (Folbre, 2008)⁷. Moreover, it is likely that choices about time allocation and family values are influenced by common, unobservable factors such as parental transmission of values and behaviour.

We then followed the literature on the cultural determinants of female participation by instrumenting filial obligations with religion variables, given that religious affiliation and practice are not often chosen by the individual and they are known to influence family values, whereas they are unlikely to influence hours of work or care directly. An additional instrument that we used was country dummies which can be seen as proxying institutional specificities shared by all respondents of a given country. An important country factor is provisions of public or subsidized care. Costa-Font (2010) argues that expectations to be able to rely on children's care influence coverage of public or publicly subsidized eldercare provisions. Our reasoning is that this is plausible in the long run since a public care infrastructure takes time to build. In the short run the reverse causation process is likely to be dominant, namely generous (low) public provisions weaken (strengthen) individual perceptions of responsibility towards older parents or relatives.

Operationally, we constructed a *cultural indicator of family obligations* based on questions from the SHARE drop-off questionnaire⁸. We then included the above indicator in our estimation under competing specifications. In the basic specification, the indicator was inserted as an exogenous variable alongside a set of cultural and institutional variables (religious affiliation, intensity of practice, transmission from parents, the respondent's country). In preferred specifications we allowed for mutual influence of family obligations and

⁶ Jiménez-Martina & Prieto (2015) also recently investigated motivations for caring among adult children in European countries using SHARE DATA. However, the core question of the paper is whether motivations are driven by altruism or exchange, and the key finding is that informal caregiving children are less likely to receive monetary transfers from parents. The main focus, therefore, is not on cultural motivations per se but on some kind of delayed reciprocity with monetary transfers from parents to children being later 'paid' back with informal eldercare.

⁷ Folbre (2008:109) has this to say in her discussion about the strong emotional component of caring activities
*'Evidence suggests that individuals in jobs requiring more intellectual skill get successively "smarter."
(Kohn and Schooler 1983) Similarly, in jobs requiring care, individuals may become more caring.'*

⁸ Cox and Soldo (1970) extensively discuss the value added that answers to drop-off questions may offer to 'standard' applied work about eldercare. The authors are well aware that the risks of misrepresentation on the part of respondents may be high. However, after careful examination of the results of a blank experimental module 'benevolence and obligations' within the 2000 wave of the Health and Retirement Survey, the authors conclude that economic analysis of decisions to work and care stands to gain from incorporating the results from such surveys.

care behavior, and we instrumented the former with religion variables and country identifiers. As we document in section 5, statistical testing is in favour of endogeneity.

4. Data and methods

4.1 The data

The analysis is based on the Survey of Health, Ageing and Retirement in Europe (SHARE) collecting multi-disciplinary individual data on health, socio-economic status, and social and family relationships over the age of fifty. SHARE has the advantage of recording differences in welfare policies, cultures and histories among European countries. The target population consists of *all persons born in 1962 or earlier* having their regular domicile in the respective country, together with their current partners/spouses, independent of age. Only one age-eligible member plus his/her partner/spouse is interviewed within a household.

This paper is based only on SHARE waves 1 and 2, for which fieldwork was carried out in 2004 and 2006/2007, respectively. We could not utilise the more recent waves, because our variable of interest – hours of care – is no longer included. Given the information provided by SHARE, one may think of drawing different samples of children with elderly living parents depending on the variables of interest. We needed information about care hours and work hours, which is only available for the respondent not her/his relatives. Our sample therefore included respondent children and stepchildren aged between 50 and 60 years old who were potential carers and who provided some information on their living parents, such as their age, health status, and closeness of residence. We identified as actual carers those children and stepchildren who gave daily care to at least one parent (or parent in law) outside the family. All kinds of care were considered, including personal care, practical household help, and help with paperwork: we assumed, in fact that all care is relevant if it is given daily, not only personal care. Our carers might give care to other co-residing or non co-residing individuals (including co-residing parents) and we controlled for this by means of a dummy. Male carers were included and accounted for 25% of children giving regular extra-residential care in our sample. Further details on the characteristics of the sample can be found in Table 1.

As noted earlier, our specific goal is to estimate the effect of providing parent care on work behaviour at the intensive margin, with especial attention to the role of filial obligations therein. Hence our target dependent variable is hours of care as function of hours of work. Therefore, we resorted to the larger sample to estimate potential selection (11823 observations) while using the subsample of caregivers to estimate hours of care. The latter is much smaller (770 observations) because it only includes children who gave care of all kinds to non co-residing parents on a daily basis. In line with the assumption of simultaneity, we conducted a parallel estimation of hours of care as a function of hours of work, and conversely, using the same subsample. However,

the estimates that we obtained for hours of work ought to be treated as ‘instrumental’ because they are not a central concern of this paper and would ideally require a different sample.⁹¹⁰

4.2 Econometric specification

Given the noted issues of selection and endogeneity, we resorted to two-stage and three-stage OLS in succession, correcting for selectivity in both cases.

We first derived selectivity correction terms from fitting the following bivariate probit model on the entire sample:

$$C^* = X_1\delta_1 + R\delta_2 + \varepsilon_1 \quad \text{with } C=1 \text{ if } C^*>0 \quad [1]$$

$$W^* = X_2\pi_1 + R\pi_2 + \varepsilon_2 \quad \text{with } W=1 \text{ if } W^*>0 \quad [2]$$

where

- C^* and W^* denote, respectively, the latent propensity to care and to be employed, while C and W denote the observed binary for caregiving and for employment status
- R denotes a vector of cultural and institutional variables (religion, political views, country identifiers, statutory pensionable age) which are assumed to be exogenous- X_1 , X_2 , stand for vectors of (exogenous) individual and household controls - from demographic to health related factors, to household composition and characteristics
- ε_1 , ε_2 are assumed to be jointly normally distributed, with mean zero and unitary variance.

biprobit estimation of these equations yields, λ^c and λ^e , the selection correction terms for the decision to care and the decision to work of the double selection framework proposed by Tunali (1986).

At the intensive margin of decisions about working and caring, a simultaneous system of equations can be used to represent how hours of work and hours of care interact with each other and with family values:

$$h^e = X_3\beta_1 + h^{IC}\beta_2 + FOS\beta_3 + \varepsilon_3 \quad [3]$$

$$h^{IC} = X_4\gamma_1 + h^e\gamma_2 + FOS\gamma_3 + \varepsilon_4 \quad [4]$$

where:

- h^e stands for hours of work, h^{IC} for hours of care of the individual in 2004 and 2006.
- FOS is the filial obligations score
- X_3 X_4 are vectors of exogenous variables, including demographic, health related and institutional variables

⁹ If we had chosen to focus on estimating hours of work as a function of hours of care, a different and larger sample would have been appropriate, namely employed respondents.

¹⁰ The SHARE data that we use have a panel structure but we decided not to exploit this structure principally because this would have entailed a loss of almost one third of the data against the small advantage of exploiting a very short panel (two years only).

- the error terms $(\varepsilon_1, \varepsilon_2, \varepsilon_3)$ and $(\varepsilon_1, \varepsilon_2, \varepsilon_4)$ are joint normal distributed with mean zero and unitary variance

If we now correct for selectivity, we can obtain the parameter of interest by means of 2SLS or 3SLS estimation of the following equations:

$$h^e = X_3\beta_1 + h^{IC}\beta_2 + FOS\beta_3 + \lambda^e\beta_4 + u_3 \quad [5]$$

$$h^{IC} = X_4\gamma_1 + h^e\gamma_2 + FOS\gamma_3 + \lambda^{IC}\gamma_4 + u_4 \quad [6]$$

where:

- u_3 is a linear combination of ε_3 in [3] and λ^e with $E(u_3 | W^* > 0) = 0$
- u_4 is a linear combination of ε_4 in [4] and λ^{IC} with $E(u_4 | C^* > 0) = 0$ (Tunali, 1986)
- FOS is potentially endogenous

The instruments used for hours of care in [5] are distance of the children from the parents, the health condition of the parents and the selection term for hours of care λ^{IC} obtained from [1] and [2] (λ^e in [5] is used to correct the selection bias). Age (grouped), level of education and the selection term for hours of work λ^e were used as instruments for hours of work in [6] (while λ^{IC} in [6] is used to correct the selection bias). Finally, the instruments that we chose for the filial obligations score comprised religious affiliation, intensity of religious practice, parental transmission of religion, and country identifiers, all of which were discussed earlier. While the chosen instruments are consistent with the theoretical framework we have outlined, they also satisfy the relevant over- and under-identification tests. The results from the endogeneity tests are also such that endogeneity cannot be rejected for hours of work in the hours of care equation and for FOS. All this is discussed further in the next section and in Appendix D.

As well known, the three-stage OLS is more efficient than 2SLS because it allows for correlation of the error terms between the two equations that are separately estimated by 2SLS (Wooldridge, 2012). This is the main advantage of 3SLS and the reason why we performed it in addition to 2SLS. It is equally well known, however, that, should one of the two equations be misspecified, in 3SLS misspecification would carry over to the other equation, unlike in 2SLS. As we document below, both sets of estimates yield fairly similar results, which is reassuring about the soundness of our specification. Given higher efficiency, our preferred specification is 3SLS. For the sake of comparison, we also report a ‘basic’ OLS estimate where all issues of simultaneity and endogeneity were ignored, and the full set of explanatory variables was used.

4.3 Variables

Our Dependent variables, hours of work and hours of care, are measured in logarithms and, for each respondent child, each is capped to 24 hours, and so is their sum. Given that hours may be measured with error, instrumentation in 2SLS and 3SLS is also meant to correct for this potential source of bias. In addition, capping should eliminate large and obvious sources of error, while the log transformation reduces the skewness of both distributions.

Explanatory variables that only feature on the right hand side and were treated as *exogenous* across all specifications include:

- *demographic and health related variables*. They comprise sex of the adult child; marital status and age group of the child, with finer grouping between 55 and 69 years of age; level of education and health level of the child (three levels); health level of the spouse of the child and a dummy for bad health of at least one of the child's parents.

Better educated adult children are less likely to provide care due to the higher opportunity cost of current and future earnings. Education together with gender, marital status and the presence of dependent children also capture the work/leisure care trade-off. Higher value of the leisure used in productive domestic work and also in providing care, tends to reduce labour supply and increase the supply of care among women under traditional gender roles. The presence of children introduces a further trade-off between the time devoted to them and that devoted to elderly parents. Good own health eases one's time constraint and is therefore likely to boost one's supply of both paid work and informal care. The same applies to the health of one's spouse: the presence of a healthy spouse reduces the demand of caregiving from the partner and frees her/his time for external care. The converse expectation holds for parent's health, since the healthier they are, the less they need care from their adult children. Co-residence with at least one parent is also expected to diminish the amount of care supplied outside the household.

- *variables capturing composition and characteristics of the adult child's family*. We considered: household income quartile and household net worth (wealth); where the mother lived (in the same household, building, or at some distance away); whether or not the adult child had living siblings (sister or brother); whether there were no dependent children in the household; whether the adult child regularly assisted other, generally adult, members of the household ¹¹.

Higher household income (other than one's own labour income) is conventionally expected to decrease work for the market, hence easing the potential conflict with informal caring. An additional, and much investigated, issue in the literature is that of intergenerational solidarity and the role of bequests (Du, 2012; Kohli, 1999). This literature tends to conceptualise the family as an informal insurance market. It is argued that transfers within the family are motivated by factors beyond altruism and can represent exchange-type transactions among generations (Brown, 2006). The more affluent the family, the higher the potential transfers may be, with a positive effect on care supplied by children. However, higher income can be used to buy formal care if the latter is a normal good. Hence the net effect may be weak.

For the reasons mentioned earlier, we did not adopt the "household bargaining" approach but allowed for strategic interactions among family members by including the presence of siblings at the estimation stage. Our expectation was a downward effect on own care supply, especially in the case of sisters. As to place of living

¹¹ The incidence of adult children also caring for someone in the household was very limited in our actual caregivers sample, less than 10 percent. Only two non-adult children were part of the cared for, and they were likely to be children with some permanent disability

of parents, we eventually chose only to control for where the mother lived because, on the one hand this is highly correlated with where the father lives, and on the other hand more mothers than fathers are recipients of outside care (due to longevity).

- *institutional variables* include countries identifiers and statutory retirement age in each country. The statutory retirement age¹² is important because entitlement to a pension entails a strong, negative income effect on labour supply but also because of widespread preferences for synchronized leisure time. Thus, for example, if one partner has reached retirement age he or she may exert pressure on the spouse to retire early (Stancanelli & van Soest, 2012). Another important source of heterogeneity across countries is the availability of (affordable) formal care facilities, which is usually measured by the coverage rate of subsidized provisions. The latter can be viewed as investment in care infrastructure built gradually over time and, at any point of time, may be taken as a given in analogy with investment in physical infrastructure. Other, less observable sources of institutional heterogeneity can be captured by country identifiers. At implementation stage, however, simultaneous inclusion of these three indicators of institutional heterogeneity gives rise to collinearity; and in our case multicollinearity was practically perfect between country dummies and coverage rates of formal facilities in both samples and between the latter and statutory pensionable age in the women only sample. In the latter case, we retained statutory pension age for estimation on the entire sample. In the former we had to choose between a specific indicator - subsidized formal care coverage - and a general indicator - country identifiers - that would capture heterogeneity of formal supplies but also other sources of institutional heterogeneity. So we chose country identifiers.

- *cultural variables* comprise religious affiliation (protestant, catholic, orthodox, other, none); whether or not religion was transmitted from parents; religious intensity (a three-level frequency of praying dummy) and a missing dummy to account for the high level of non-response to the question about affiliation. As repeatedly noted, variables related to religion were used to instrument filial obligations. The filial obligations score is an ordinal variable capturing the strength of perceived child-parent and child-grandparent obligations. It was constructed using principal component analysis (Filmer & Pritchett, 2001; Gwatkin et al., 2007; Vyas & Kumaranayake, 2006) of the answers to the questions in the questionnaire reported in Appendix A. The score ranges from a maximum of 5.64 to a minimum of -1. The higher the value, the stronger the perception of responsibility, hence the expected propensity to care. Because of the high frequency of missing answers to the drop-off questionnaire a dummy for non response was included in the estimation of the score.

- *political standpoint*. A fourfold, categorical dummy recording own political views (respectively left, centre, and right leaning views, and no views) was drawn from the drop-off questionnaire. Although we did not find in the literature any strong conceptual or empirical link between political views and propensity to offer informal (elder) care, we included this variable to further control the heterogeneity of individual values.¹³

¹² Source: (OECD Pensions at a Glance 2005, 2005 table 2.1)

¹³ We tested the possibility of including political views among the instruments for filial obligations, but the results were negative, whereas inclusion of this variable in the set of controls improved the precision of FOS estimates.

Table 1 sets out descriptive statistics for the dependent variables and covariates among potential caregivers ('entire sample' henceforth) and actual caregivers ('caregivers subsample')¹⁴.

Table 1. Mean values of variables

		ENTIRE SAMPLE (11823 obs.)	CAREGIVERS SAMPLE (770 obs.)	FEMALE CAREGIVERS (587 obs.)
Work (% dist.)	Yes	59.4	46.0	40.2
All Daily care (% dist.)	Yes	7.4	100.0	100.0
Hours of care (by day)				4.245
Hours of work (by day)		0.428	3.899	
		3.173	2.258	1.760
Sex (% dist.)	Female	53.5	72.0	100.0
Marital Status (% dist.)	married or cohabiting	79.5	82.0	83.3
Health (% dist.)	Good personal health	78.8	78.6	77.6
	Fair personal health	17.1	18.2	19.1
	Bad personal health	4.2	3.2	3.3
Age (% dist.)	<45	2.1	2.2	2.7
	45-54	45.9	41.4	42.0
	55-64	44.3	46.0	45.4
	65-69	5.8	9.1	8.7
	>70	1.9	1.3	1.1
Education (% dist.)	Compulsory school	37.1	43.1	45.5
	Higher secondary school	35.8	33.1	31.2
	University degree	27.1	23.8	23.4
Wealth (PPP Euros)	Household net worth/10000	26223	28459	29022
Quartiles of household income (excluding respondent: % dist.)				
	Lowest quartile (1) <25	32.6	32.2	29.6
	2 (25-50)	23.7	23.8	24.1
	3 (50-75)	19.3	14.6	14.2
	4 (> 75)	24.5	29.4	32.1

¹⁴ In order to keep the table within manageable proportions we have omitted reporting statistics for country dummies and dummies for missing variables. Briefly, the shares of observations accounted by each country in the caregivers subsample are, respectively Austria: 2.5%, Germany: 30%, Sweden: 2%, Netherlands: 4%, Spain: 15.8%, Italy: 32.3%, Denmark: 1.2%, Greece: 5.0%, Switzerland: 1.7%, Belgium: 5.5%.

The share of missing values is 42.1% for religious affiliation, 14.8% for Intensity of religious practice and 27.4% for the FOS score.

NO dependent children (% households)		9.6	11.5	6.1
Health of spouse (% dist.)	Good health	46.4	50.0	51.7
	Fair health	11.1	10.8	10.5
	Bad health	3.2	2.5	2.7
Health of parents(%)	parent(s) with 'bad' health	47.4	63.1	63.8
Siblings (% dist.)	Brothers (1+)	74.2	70.3	71.7
	Sisters (1+)	70.9	67.0	67.8
National pension age (years)		64.9	64.9	64.9
Where mother lives (% dist.)	In the same household	2.9	1.8	2.0
	In the same building	5.5	18.4	17.0
	< 1 km away	17.9	29.6	30.8
	1-5 km away	20.4	20.9	21.5
	5- 25 km away	21.2	10.2	9.3
	25-100 km away	14.4	4.3	4.2
	100-500 km away	10.3	3.3	3.2
	> 500 km away	3.2	1.4	0.8
	> 500 km away and abroad	4.3	0.4	0.3
	Co-residential caregiver (%)	Yes	5.9	7.0
Religious affiliation (% dist.)	Roman Catholic	13.3	12.4	13.1
	Protestant	24.1	33.9	33.3
	Greek or Russian Orthodox	4.2	3.7	3.9
	Other	1.5	0.5	0.5
	Not religious	8.1	6.7	7.0
Intensity of religion (% dist.)	Daily religious practice	22.1	31.6	37.0
	Weekly practice	15.1	17.6	17.7
	Less than weekly practice	44.9	36.5	30.5
Religion: parental transmission (Yes)		39.0	48.9	50.4
Familial obligations score	Score value	3.249	3.450	3.468
Political views (% dist.)	Left (0-4)	23.4	19.8	16.3
	Right (6-10)	17.2	18.6	17.7
	Centre (5)	24.0	26.0	25.7
	Apolitical	35.4	35.6	40.3
Number of observations		11,823	770	587

Source: SHARE, 2004 and 2006 runs

5. Results

5.1 The intensive margin: choice of hours

Our key results from simultaneous estimation are summarized in Table 2. The first notable result concerns the magnitude of the conflict between work and intensive care. The number of work hours negatively affects the number of daily care hours and the effect is significant at the 1% level. The elasticity of hours of care with respect to hours of work is -0.18 for the full sample (comprising men and women) and -0.19 for the women-only sample. If we refer to observed average hours of care and observed average hours of work in the full sample, the elasticity that we estimated implies that an increase of the average, weekly, work hours by 10% (1 hour and 35 minutes per week out of the average figure of 15 hours and 48 minutes) reduces the time spent providing care by about 29 minutes (out of an average 27 hours and 18 minutes); more minutes would be lost in the women-only sample (33 minutes) because the average amount of care hours is higher. There are no comparable estimates in the literature to serve as benchmark; however, Carmichael et al (2010) also found that employment participation and earnings negatively impact on the willingness to supply informal care and that the effect is greater in relation to hours of caring. All this is consistent with the expectations raised by the literature that the conflict between caring and working deepens when intensive care is provided. The novelty of our estimates is not only that they provide for the first time figures for the reduction of care hours, but also the order of magnitude involved, which is small but not negligible. Contrast, for example, our estimate of an elasticity of -0.18, with that reported fairly recently by Bolin, who, using the same data source, finds an elasticity of -0.026 when the causation works in reverse (from hours of care to hours of work Bolin et al., 2008: table 8).

Table 2. Summary results from preferred estimation. Estimated coefficients in the full sample and the women-only sample

Independent var. Dependent var.	MEN AND WOMEN		WOMEN ONLY	
	Daily hours providing care(log)	Daily work hours (log)	Daily hours providing care (log)	Daily work hours (log)
Daily work hours (log)	-0.180***		-0.186***	
Familial obligations score	0.155**	-0.219***	0.162**	-0.304***
Daily hours providing care (log)		-0.206		-0.197

Our second and notable result is that the impact of familial obligations is positive and, again, not negligible. As expected, an increase in the FOS augments the number of hours of external care supplied daily with a p value below one percent in both cases. Again, the effect is somewhat larger in the women-only sample than in

the entire sample. And, again, this is to be expected given that familial obligations are traditionally allocated to women in European societies. Increasing the average FOS score by 10% (three and a half decimal points) boosts average informal care hours by about 3 and an half minutes per day in the entire sample, adding up to 25 minutes per week, almost 27 minutes for women. However, cultural attitudes do not change incrementally, and it makes more sense to consider a one point increase (or decrease) out of the seven points range of the FOS: this would boost by almost 1 hour and a quarter (74 minutes) the weekly amount of informal care in the full sample, up to one hour and 20 minutes in the women-only sample.

Table 2 also reports results for the estimation of hours of work. It indicates that hours of care have a negative impact on hours of work, and the estimated elasticity is similar to that obtained for the hours of care equation (slightly smaller in the entire sample, slightly larger in the women-only sample). However, it is not statistically significant. A strong sense of responsibility towards family members also appears to reduce hours of work considerably, and the effect is highly significant. As we noted, however, these estimates should be considered instrumental since a different and larger sample would be appropriate. For this reason, additional results are reported in appendix C and without any further commentary.

Let us now consider the results for the estimation of hours of care in greater detail. Table 3 reports separately the results for the sample comprising men and women ($n=770$) and for the women-only sample ($n=587$) presenting three specifications for each sample. The first is an OLS estimation which does not correct for selectivity and where all the covariates are treated as exogenous. The second is a 2SLS specification where both potentially endogenous variables - hours of work (in logs) and the familial obligations score – are instrumented and, moreover, selection into caregiving status is corrected by means of the relevant lambda ('lambda care').

Our key variable of interest, hours of work, bears the expected sign and is significant at the conventional level across the three specifications. In contrast, the family obligations score bears the right sign (positive) and is fully significant only after instrumentation. The positive sign implies that, as expected, the more family oriented a person is, or equivalently, the stronger her/his sense of duty towards family members in need, the longer the time devoted to informal caring. This result is reinforced by that yielded by the missing answer dummy. The FOS is classified as missing when a respondent failed to answer one or more of the questions that we used to calculate the score, and the incidence of missing FOS is high (about thirty percent). The missing dummy turns out to be negative and significant across the instrumented estimations, indicating that people who did not respond to the family attitude questions tend to provide fewer care hours. This is consistent with the possibility that people with a low sense of family duty are less interested in answering the relative questions.

The direction (sign) of the effect of the remaining covariates varies little across the specifications. The well-known finding that women are overrepresented among caregivers is borne out by the large, highly significant, and positive coefficient of the female sex dummy in the full sample, which, moreover, becomes larger in our preferred specification. Not having dependent children appears to increase the supply of informal, external

care to a considerable and statistically significant extent?¹⁵. The same holds for having a parent or parent-in-law with poor health - a likely demand side effect - but the impact is weaker. Having brothers rather than sisters works in the same direction - another facet of gender caring roles - but in this case statistical significance only obtains in the women sample and it is low. Statutory pension age appears to boost hours of external care in the 2SLS specification, which runs counter to expectations. While interpreting this finding is less than straightforward, a composition effect may be at work. Arguably, where the conflict between working and caring is stronger, informal care may be given more often in worst case situations where longer hours of assistance are needed. Finally, residential closeness of the mother also matters in the 2SLS specification, and the effect is positive, indicating that co-residence with the mother helps to free resources for external care.

In the last three columns of table 3 we show the results for the women-only sample. Some differences are worth noting compared to the full sample. The effect of having no dependent children is amplified in the women-only sample, implying that it matters more for the mother caring for her parents whether or not there are dependent children. So is the effect of co-residing with the mother and that of having brothers rather than sisters, consistently with widespread gender roles.

Two final issues are worth discussing which impinge on the validity of our model specifications. The first concerns selectivity. If we consider the estimates for the entire sample, the selection term ('lambda care') turns out to be positive and fully significant in both the 2SLS and the 3SLS specifications. This indicates that (unobserved) factors which make caregiving more likely tend to be associated with more hours of care. Interestingly, the term is less significant in the women-only sample, implying that, in comparison to men, actual female caregivers are more similar to potential female caregivers. The assumption of endogeneity [on grounds other than selectivity] cannot be rejected either. However, it does not receive strong confirmation from our findings. The last row of table 3 sets out the p values for the usual identification and endogeneity tests carried out on the joint set of instrumented variables. While we refer the reader to Appendix D for additional details on all these tests, the findings deserve further comments. Endogeneity for the joint set of variables is a concern in both samples (probability of error below 10%). However, results differ somewhat for the obligation score and hours of work, respectively. Separate testing confirms rejection of exogeneity for the FOS variable in both the full and the women-only sample. Concerning hours of work, exogeneity is weakly refuted for the women-only sample, whereas refutation for the entire sample entails a large error term (12%). Hence the hours of work variable can be safely assumed to be endogenous only with reference to female caregivers. Overall, however, we believe that these findings justify 2SLS and 3SLS estimations.

¹⁵ This finding is opposite to that of van Gameren & Naranjo (2015), who found that in Mexico, the presence of children increases the time devoted to both elderly and child care as primary activities. One way to account for this diversity of findings is to hypothesize greater complementarity between child and elderly care in the Mexican context probably due the fact that different generations are more likely to live together. However, other explanations are possible and the issue deserves further investigation.

Table 3. Full results for the three key specifications. Dependent variable: hours of care (log)

		Full sample						Women only sample					
		OLS		2SLS and correction for selectivity		3SLS and correction for selectivity		OLS		2SLS and correction for selectivity		3SLS and correction for selectivity	
Hours of work (log)		-0.087	***	-0.195	***	-0.179	***	-0.11	***	-0.202	***	-0.186	***
Social norms	Filial obligations score	-0.083	**	0.166	**	0.155	**	-0.096	**	0.189	**	0.162	**
	FOS missingⁱ	-0.121		-0.094	*	-0.089	*	-0.11		-0.106	*	-0.104	*
Marital status	married or cohabiting	-0.233	**	-0.086		-0.089		-0.224	*	-0.129		-0.137	
Sex	Female	0.19	**	0.236	***	0.213	***						
Health	Good personal health	-0.222		-0.108		-0.128		-0.239		-0.115		-0.138	
	Fair personal health	-0.017		-0.011		-0.024		-0.025		0.047		0.035	
	Bad personal health												
Age	<55												
	55-64	0.038						0.035					
	65-69	0.077						0.057					
	>69	0.112						0.373	**				
Education	Compulsory school	-0.083						-0.071					
	Higher secondary school	-0.089						-0.084					
	University degree												
Wealth (PPP euros)	Household net worth/10000	-0.0003		0.00012		0.00009		-0.00007		0.000374		0.00117	
Quartiles of household income (excl. respondent)	Lowest quartile (1) <25	0.012		0.058		0.06		0.107		0.093		0.093	
	2 (25-50)	-0.017		0.056		0.058		-0.013		0.043		0.042	
	3 (50-75)	-0.04		-0.092		-0.074		-0.006		-0.091		-0.08	
	4 (>75)												
Not dependent children		0.053		0.204	**	0.185	**	0.26	*	0.379	***	0.361	***
Health of spouse	Good health	0.207	***	0.09		0.086	*	0.168	**	0.102		0.102	
	Fair health	0.061		0.008		0.007		-0.042		-0.037		-0.032	
	Bad health												

Health of parents	parent(s) with 'bad' health	-0.011	0.13	**	0.112	**	0.088	0.161	**	0.144	**	
Siblings	Brothers (1+)	0.108	*	0.072	0.072	0.132	*	0.108	*	0.105	*	
	Sisters (1+)	-0.086		-0.046	-0.04	-0.087		0.03		0.032		
Co-residential caregiver	Yes	0.153		0.121	0.116	0.113		0.082		0.082		
National pension age		0.074		0.042	0.042							
Where mother lives	In same household	0.001		0.222	0.241	-0.172		0.049		0.054		
	In the same building	-0.106		0.181	**	0.147	*	-0.124	0.228	**	0.207	**
	Elsewhere											
Religious affiliation	Protestant	-0.007				-0.112						
	Roman Catholic											
	Greek or Russian Orthodox	0.09				0.102						
	Other	0.182				0.13						
	Not religious	0.122				0.22						
	Religion missingⁱ	0.137				0.04						
Intensity of religion	Daily religious practice	-0.135	*			-0.156	*					
	Weekly practice	-0.077				-0.043						
	Less than weekly practice											
	Intensity of religion missingⁱ	-0.008				0.073						
Religion: parent transmission (Yes)		0.06				0.135						
Political views	left (0-4)	0.1		-0.005	0.005	0.125		-0.011		-0.002		
	right (6-10)											
	centre (5)	-0.035		-0.021	-0.021	-0.003		-0.073		-0.07		
	Apolitical	-0.087		-0.05	-0.041	-0.113		-0.131		-0.118		
Selection term	Lambda			0.315	***	0.239	***	0.306	**	0.252	**	
Constant		-2.736	**	-2.518		-2.276		2.237	***	0.364	0.554	
Number of observations		770		770		770		587		587	587	
Under identification test (p-val.)				0.000	***			0.000	***			
Overidentifying restrictions/Hansen's J test(p-val.)				0.351				0.431				
Endogeneity test (p-val.)				0.061	*			0.077	*			

ⁱ Observations with item non-response for these indicators have been coded as 1, 0 is equal to response present.

5.2 The extensive margin: deciding whether to work or/and to care

Although our focus is on the intensive margin, we also investigated conditional probabilities of providing care and being in work by means of equations [1] and [2]. These estimations, too, are instrumental, but it is worth briefly discussing the findings to show that our selection models behave broadly as we would expect in light of the literature. Table 4 summarizes the main findings, while the full results are reported in Appendix B.

Table 4. Summary table of the conditional probabilities of providing care and being in work

	Probability of working		Probability of caring	
	If providing care	If not providing care	If working	If not working
All	51.0%	60.6%	4.0%	5.8%
Men	62.0%	71.6%	2.1%	3.2%
Women	41.5%	50.4%	6.6%	9.2%

As shown by the table, the estimated probability of working conditional on providing care is on average 51.0% for the full sample, 62.0% for males down to 41.5% for females. For both men and women, the probability of working decreases by 10 pp. and 9 pp., respectively, if they are caregivers compared to non-caregivers. Women are, overall, more likely to provide care, regardless of whether or not they work. The probability of providing care, conditional on being in work is on average 4% for the full sample, 2.1% for men and three time higher (6.6%) for women. The probability increases from +1pp. among men who do not work up to +3pp. among women who do not work. Besides women, older people, people with lower education, in poor health, or from households in the medium to upper part of the income distribution are less likely to be in work if they also care. Similarly, people who provide care to someone with whom they live are less likely to be in work. The magnitude of the fall in the probability of working among caregivers is also broadly in line with estimates in the literature. It may be recalled that, in their review, Bauer and Souza Posa (2015) indicated that the fall in the probability of working ranges between 5 and 10% but can rise above for high intensity caregiving. Finally, factors that significantly enhance the probability of giving care while working include, besides being a woman, having at least one parent in bad health or the mother living in the same building rather than at some distance away.¹⁶

¹⁶ Note that the negative sign for the coefficient on ‘mothers living in the same household’ depends on the fact that we only consider care provided outside the household, while the negative coefficient on mother living at some distance away from the household actually indicate that distance of mother’s location tends to reduce informal care giving.

6. Concluding discussion

In this paper we revisited the issue of time allocation between work and informal care for one's elderly parents focusing on the magnitude of the potential trade-off at the intensive margin as well as on the role of filial obligations. Unlike most other contributions in the literature we investigated the reduction of hours of care in response to increases in hours of work rather than the other way round. While this fills a gap in the literature it also addresses a topical policy issue for countries where time available for informal care of the elderly is being increasingly squeezed by the extension of the pensionable age and where an independent tendency to stay longer in the labour market is under way among older female workers.

Our main conclusion is that the conflict between hours of care and hours of work cannot be ignored. We found that in the pooled sample of the nine countries we considered, an increase in the average, weekly, work hours by 10% (1 hour and 35 minutes per week out of the average figure of 15 hours and 48 minutes) would reduce the time men and women spend providing care by about 29 minutes, up to 33 minutes among women only. While this is well below unitary elasticity, it would be hasty to conclude that the impact is negligible. First, this is an average estimate across nine rather different countries, hence it is compatible with the possibility of a negligible impact in some countries but an important impact in others¹⁷. Secondly, data for our countries refer to the mid 2000s, i.e. before the pensionable age was significantly extended and/or the link between contribution and pension (so called 'reciprocity') was tightened in most of them¹⁸. It cannot therefore be ruled out that the trade-off between working and caring sharpened in recent years as a result.

We also found that increasing the average filial obligations score by 10% (three and a half decimal points) would boost average informal care hours by about 3 and a half minutes per day in the entire sample, adding up to 25 minutes per week. This estimate, too, is an average value across nine countries (as well as across men and women) implying that the order of magnitude could be considerably larger for women in some countries. Looking forward, the risk in this case is that familial obligations weaken over time, following a lung-run trend. Our findings suggest, in fact that, if we compare two individuals with the same work effort, informal care is higher for the individual with stronger adherence to family normative values. The tendency for these normative values to weaken over time could thus detract from their effectiveness in cushioning the conflict between caring and working.

¹⁷In absolute terms. Unfortunately, we cannot substantiate this claim with sufficiently robust country figures, mainly due to problems of sample size.

¹⁸ In particular, Switzerland is practically the only country in our group not to have significantly extended retirement age since the Great Recession set on in 2008. See also Carone et al. (2016).

Our results depend on some key methodological assumptions, in particular the hypothesis of mutual dependence between choice of caring and choice of working as well as between the former and the intensity of own normative values. However, not only did we extensively tests for both assumptions; we also found that interdependence of choices about time allocation is not crucial for our results. We would rather argue that the limitations of our estimates stem from limitations in the data, specifically the need to pool information pertaining to different countries in order to ensure a large enough sample, and the need to rely on earlier waves of the SHARE source in order to secure information on hours of care.

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APPENDIX A. CONSTRUCTION OF THE FAMILIAL OBLIGATIONS SCORE

The Familial Obligations Score is an ordinal variable capturing the strength of perceived child-parent and child-grandparent obligations. It was computed applying an Ordinal Principal Component Analysis (Filmer & Pritchett, 2001; Gwatkin et al., 2007; Vyas & Kumaranayake, 2006) to the questions from the drop-off questionnaire which are set out in Figure A.1. The drop-off questionnaire is self-completed, which results in a higher non-response rate than the main questionnaire. To account for this, we also included among our covariates a missing variable dummy variable. The FOS that we computed ranges between a maximum of 5.64 to a minimum of -1 with an average value of 3.31. The higher the value of the score, the stronger the perception of the responsibilities. Mediterranean countries score higher, consistently with the literature.

Figure A.1: Questions used to calculate the Familial Obligations Score

6. The following statements are related to the duties people may have in their family. Please tell us how much you agree or disagree with each statement.
(Please tick one box in each row)

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
	▼ ₁	▼ ₂	▼ ₃	▼ ₄	▼ ₅
a) Parents' duty is to do their best for their children even at the expense of their own well-being.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Grandparents' duty is to be there for grandchildren in cases of difficulty (such as divorce of parents or illness).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Grandparents' duty is to contribute towards the economic security of grandchildren and their families.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Grandparents' duty is to help grandchildren's parents in looking after young grandchildren.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. In your opinion, who – the family or the State -- should bear the responsibility for each of the following...:
(Please tick one box in each row)

	Totally family	Mainly family	Both equally	Mainly state	Totally state
	▼ ₁	▼ ₂	▼ ₃	▼ ₄	▼ ₅
a) Financial support for older persons who are in need?	<input type="checkbox"/>				
b) Help with household chores for older persons who are in need such as help with cleaning, washing?	<input type="checkbox"/>				
c) Personal care for older persons who are in need such as nursing or help with bathing or dressing?	<input type="checkbox"/>				

APPENDIX B. RESULTS FOR BIPROBIT ESTIMATES (full sample)

		Probability of working if caring		Probability of caring if working	
		dy/dx		dy/dx	
Age	<45				
	45-54	0.095	*	-0.001	
	55-64	-0.147	***	-0.001	
	65-69	-0.512	***	0.017	
	>69	-0.586	***	-0.025	
Marital status	Couple (married or cohabiting)	-0.007		0.008	
Sex	Female	-0.211	***	0.038	***
Education	Compulsory school	-0.228	***	-0.003	
	Higher secondary school	-0.077	***	-0.006	
	University degree				
Health	Good personal health	0.427	***	0.028	**
	Fair personal health	0.249	***	0.017	
	Bad personal health				
Wealth	Household net worth	0.00	*	0.00	
Quartiles of household income (excluding respondent)					
	Lowest quartile (1) <25				
	2 (25-50)	-0.062	***	-0.002	
	3 (50-75)	-0.224	***	-0.02	***
	4 (>75)	-0.15	***	0.004	
Number of dependent children		-0.003		0.027	**
Health of spouse	Good health	-0.023		0.000	
	Fair health	-0.074	**	-0.007	
	Bad health				
Co-residential caregiver	Yes	-0.141	***	0.003	
Health of parents	at least one parent with 'bad' health	-0.011		0.034	***
National pension age	in years	-0.014		0.003	
Political views	left (0-4)	-0.005		-0.005	
	right (6-10)				
	centre (5)	-0.025		0.002	
	Apolitical	-0.026		-0.006	
Intensity of religion	Daily religious practice	-0.032		0.01	
	Weekly religious practice	-0.022		0.000	
	Less than weekly religious practice				
	Intensity of religion missing	-0.024		0.006	

Type of religion	Protestant	0.054		-0.003	
	Roman Catholic				
	Greek or Russian Orthodox	0.015		-0.011	
	Others	0.009		-0.042	**
	I do not belong or feel attached to any religion	0.038		0.002	
	Type of religion Missing	0.039		-0.008	
Parent transmission of religion (Yes)		0.007		0.012	
Where does mother lives					
	In the same household	-0.068		-0.091	***
	In the same building				
	Less than 1 kilometre away	0.001		-0.037	***
	Between 1 and 5 kilometres away	-0.016		-0.059	***
	Between 5 and 25 kilometres away	-0.057		-0.093	***
	Between 25 and 100 kilometres away	-0.024		-0.116	***
	Between 100 and 500 kilometres away	-0.08		-0.115	***
	More than 500 kilometres away	-0.03		-0.088	***
	More than 500 kilometres away, abroad	-0.098		-0.16	***
Siblings	brothers (YES)	-0.002		-0.004	
	sisters (YES)	-0.002		-0.005	
Country	Germany	0.144	**	-0.003	
	Sweden	0.391	***	-0.018	
	Netherlands	0.197	***	-0.014	
	Spain	0.135	**	-0.016	
	Italy	0.092		-0.008	
	Denmark	0.284	***	-0.016	
	Greece	0.072		-0.008	
	Switzerland	0.363	***	-0.019	
	Belgium	0.087		0.012	
	Austria				
Number of observations		11823		11823	

Key: § denotes the reference category

APPENDIX C. FULL RESULTS FOR THE ESTIMATION OF HOURS OF WORK

		Dependent variable: working hours in logarithms (Simultaneous estimation)			
		All sample		Women sample	
Hours of care (log)		-0.206		-0.197	
Social norms	Filial obligation index	-0.219	***	-0.304	
	Filial obligation index missing [†]	-0.053		-0.041	
Marital status	Couple (married or cohabiting)	0.049		-0.007	
Sex	Female	-0.337	***		
Health	Good personal health	0.351	***	0.217	*
	Fair personal health	0.158		0.084	
	Bad personal health				
Age	<55				
	55-64	-0.286	***	-0.255	***
	65-69	-0.674	***	-0.613	***
	>69	-0.663	***	-0.486	***
Education	Compulsory school	-0.26	***	-0.211	***
	Higher secondary school	-0.197	***	-0.195	***
	University degree				
Wealth (PPP Euros)	Household net worth/10000x	0.001	**	0.001	**
Quartiles of household income (excl. respondent)	Lowest quartile (1) <25	0.198	***	0.208	***
	2 (25-50)	0.168	***	0.151	***
	3 (50-75)	-0.051		-0.063	
	4 (> 75)				
Dummies No dependent children		-0.012		0.112	
Health of spouse	Good health	-0.09	*	-0.039	
	Fair health	-0.186	***	-0.112	
	Bad health				
Co-residential caregiver	Yes	-0.143	**	-0.094	
National pension age		0.017			
Mothers' residence	Mother in the same household	0.032		-0.076	
	Mother in the same building	0.096	*	0.11	*
	Mother elsewhere				
Political views	left (0-4)	0.045		0.063	
	right (6-10)				
	centre (5)	-0.015		-0.030	
	Apolitical	-0.052		-0.014	
Selection term	Lambda	0.944	***	0.893	***
Constant		0.885		1.993	***
Number of observations		770		587	

APPENDIX D. IDENTIFICATION AND ENDOGENEITY TESTS

When errors are assumed to be i.i.d., the test for weak identification automatically reported by the `ivreg2` procedure in the STATA software (which we have used for 2SLS) is an F version of the Cragg-Donald Wald statistic, $(N-L)/L1 * CDEV$, where L is the number of instruments and $L1$ is the number of excluded instruments. Stock and Yogo (2005) have compiled critical values for the Cragg-Donald F statistic for several different estimators.

Like the C statistics, the endogeneity test implemented by STATA with the command `ivreg2` is defined as the difference of two Sargan-Hansen statistics: one for the equation with the smaller set of instruments, where the suspect regressor(s) are treated as endogenous, and one for the equation with the larger set of instruments, where the suspect regressors are treated as exogenous. The null hypothesis is that the specified endogenous regressors can actually be treated as exogenous.

In the test of over-identifying restrictions for efficient GMM estimators the test statistic is Hansen's J statistic. A rejection casts doubt on the validity of the instruments. The instruments should be 'strong' and 'valid' in Murray's (2006) terminology. When economic theory does not suffice to clearly identify good instruments, econometric tests become the best means to judge whether the chosen instruments are strong and valid. Murray (2006) suggests using the Staiger & Stock (1997) "rule" to examine whether instruments are strong and using the test of over identifying restrictions to judge their validity. Following Staiger and Stock, the instruments can be considered as good if the first-stage F-statistic of the regression of the variable to be instrumented on the instrument is above 10. The test of over-identifying restrictions is the Hansen's J test.