Who cares for mom and dad?
Unpaid caregiving and labor supply among the working-age population in Europe

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Abstract
Population ageing affects most European countries, pressurizing pension and care systems. This combination fuels demand for formal and informal care, implying that many, particularly women, are faced with dual responsibilities of paid work and unpaid caregiving. We study the relationship between unpaid caregiving for parents and labor supply (in terms of employment and work hours) among older adult men and women (40-65) across Europe. Data from the Survey of Health, Retirement, and Ageing in Europe (SHARE) 2004-2015 are analyzed through OLS and 2SLS estimations. We find regional variation in the association between unpaid caregiving and labor supply. Intensive caregiving among women is generally negatively associated with paid employment, though this is not the case for less intensive care. Care for an elderly parent impact both women's and men's labor supply negatively. Our findings indicate that more extensive social infrastructure for caring may diminish labor supply effects of intensive unpaid care.

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1. Introduction

Population ageing affects most European countries today, pressurizing pensions and health and caring services, creating an imperative to increase labor supply, for example by extending working lives through policies such as increasing the statutory pension age. Alongside this, there has been an increased emphasis on the provision of in-home care in Europe (OECD 2017), implying that many older adults are challenged by the twin responsibilities of caring for the sick and elderly and participating in the labor market. In this paper, we investigate time-related conflicts that arise from this among men and women, potentially providing care for elderly parents, across Europe.

Informal care is economically important for both individuals and nations as it is often seen as a low-cost alternative to formal care services. Estimates of its value are high, although the net economic impact of caregiving is nuanced and dependent on the type of care and the relationship between employment and caregiving (Jacobs et al. 2013). The prevalence of informal care varies from country to country (OECD 2011ab). While there are large social gains to be made from increasing informal care, the costs associated with informal caregiving are mainly individual. Informal care does not incur any direct costs for the care recipient, but it does incur indirect costs for the care provider, who may experience negative consequences in terms of income, health, and well-being (Bauer & Sousa-Poza, 2015). These individual costs are seldom considered when policymakers promote informal care. Moreover, shrinking family size and increasing female labor force participation, who have shouldered the major part of unpaid care, limit the supply of informal care in many contexts. However, common features of informal care exist across countries, e.g. women are disproportionately involved in caregiving (Arber & Ginn 1997; Carmichael & Charles 1998); half of all carers balance employment and caring responsibilities (Yeandle et al. 2006; Sinha 2013); and older people supply large amounts of informal care (Jegermalm & Jeppsson Grassman 2009).

The literature aimed at understanding the caring contribution of older adults is growing (Carmichael & Ercolani 2014; see Bauer & Sousa-Poza 2015 for a review). Many studies on informal care and work-related tradeoffs focuses on the United States and the United Kingdom. Results generally indicate a negative association between unpaid care and labor market outcomes (Lilly, Laporte & Coyte, 2007; Bauer & Sousa-Poza, 2015). Findings for European countries also point in the direction of a negative relationship between unpaid care and labor market participation, and indicate differences between men and women and across countries (Spiess & Schneider, 2003; Bolin, Lindgren & Lundborg, 2008; Kotsadam, 2011; Ciani, 2012; Crespo & Mira, 2014; Schmitz & Westphal, 2017; Kolodziej, Reichert & Schmitz, 2018). While the demographic context for caring is similar across Europe, policy contexts have important differences (Esping-Andersen 1999; Bettio & Plantegna 2004; Simonazzi 2009) concerning private versus public spending and policies targeting caring and the labor market, carers' well-being and financial assistance to carers. There is a need for more comprehensive international comparisons, especially incorporating Eastern European countries, which have been less explored than other contexts.

1.1 Aim and objectives

The overarching aim of this study is to investigate the relationship between unpaid care provision and labor supply among older adult men and women across Europe. More precisely, we focus on the provision of unpaid care to elderly parents, which make up the most common group that older adults provide care for. We add to the literature by studying the impact of regularly helping a parent, who lives in a different household, on individual labor supply on both the extensive and intensive margins. We also study the impact of caregiving intensity on

employment status and work hours. We extend on previous research by analyzing new data for more countries across Europe, highlighting gendered patterns in the unpaid care-paid work tradeoff across Europe. Data from the Survey of Health, Retirement, and Ageing in Europe (SHARE) 2004-2015 are analyzed, using OLS and 2SLS estimation techniques.

We find patterns for the association between caregiving responsibilities and labor supply across Europe that are gendered, and dependent on caregiving intensity. Intensive caregiving among women is generally associated with a reduced likelihood of being in paid employment, while no negative relationship is found in the case of less intensive care for neither women nor for men. Both women and men who care for an elderly parent tend to work less hours than non-caregivers. While evidence of endogeneity is present for a number of country subgroups, exogeneity cannot be rejected.

2. Background

Informal, unpaid, care can be defined through the characteristics of the care providers. Bauer and Sousa-Poza (2015) suggest a definition whereby a typical informal caregiver has a close relationship to the care recipient, no professional training, no contract and no pay, a wide range of duties, no officially defined working hours, and no entitlement to social rights. The OECD (2017) defines informal carers as "people who provide help to older family members, friends, and people in their social network, living inside or outside of their household, who require help with everyday tasks". In this paper, we focus on adult children providing care to elderly parent(s) who live independently. This group is especially relevant from a policy perspective as they make up a large share of care providers in Europe.

Determining impacts of unpaid caregiving on labor market outcomes is complicated because of endogeneity in the decision-making process. Individuals may choose to become caregivers partly based on the size of their opportunity cost that consists of forgone earnings from employment. If caregiving is exogenous, estimates that do not account for endogeneity can be interpreted as the causal effect of caregiving. On the other hand, if caregiving is endogenous, the causal effect has to be estimated using methods that reduce bias from reverse causality.

2.1 Previous research on informal/unpaid caregiving

Studies commonly focus on the tradeoff between employment and caregiving (Wolf & Soldo, 1994; Pavalko & Artis, 1997; Lilly et al., 2007 for reviews). The tradeoff between employment and caring is supported by international evidence of substitution between provision of care and labor supply (Johnson & Lo Sasso, 2000, 2006; Spiess & Schneider, 2003; Lilly et al., 2007; Lilly et al., 2010; Bolin et al., 2008; van Houtven et al., 2013). Recent research indicates that caregiving intensity (i.e. the amount of time spent on informal care) is of significant relevance for the employment of working-aged caregivers (Heitmueller, 2007; Lily et al., 2010; van Houtven et al., 2013). This tradeoff regarding time allocation is determined by personal characteristics, family situation and institutional context (Arber & Ginn, 1997; Vlachantoni, 2010) but also through sorting and gender segregation in the labor market with women earning lower wages and being over-represented in jobs with flexible work schemes that enable them to take on caring responsibilities throughout their careers (Stone & Short, 1990; Carmichael & Charles, 1998; Carmichael & Charles, 2003; Sarkisian & Gerstel, 2004; Carmichael et al., 2010).

Studies commonly focus on women, highlighting gender-specific processes that may operate among women rather than among men. A handful of studies have explored the differential effect of caregiving on men's and women's employment outcomes. In Canada, Lilly et al.

(2010) found a similar effect of intensive (i.e. primary) caregiving for both men and women. In the UK, Carmichael and Charles (2003) had similar findings for both men and women providing at least 10 hours of care per week, but found divergent explanations for this negative association. They concluded that for women the association was due to a dominant substitution effect (i.e. women substituting unpaid for paid care), while for men the association was due to an indirect effect of a lower ability to earn.

Among studies that look at the role of employment in the supply of caregiving, some have found that differences in the amount of help men and women provided to parents remained significant when they controlled for employment status, and that this status did not affect help to parents (Finley, 1989; Stern, 1995). Laditka and Laditka (2001) found that gender differences in the likelihood of providing help to parents persisted on both the extensive and the intensive margin when controlling for paid work hours. On the other hand, Gerstel and Gallagher (1994) find that a broader set of employment characteristics taken together, significantly reduced the gender gap, and in line with this, Sarkisian and Gerstel (2004) found that much of the gender gap in help to parents was explained by gender differences in employment patterns. These results suggest that gender differences in caregiving to other adults may be decreasing over time as men's and women's work lives become more similar, and that gender differences in caregiving to other adults may be smaller in more gender equal contexts where men's and women's labor force participation rates are similar.

Even when a negative association is found between caregiving and labor supply, it is difficult to establish a causal direction for this association. Relatively few studies have been able to disentangle whether caregivers tend to have lower labor force participation because caregiving duties have caused them to exit the labor force, or because individuals who already have a lower opportunity cost of time are more like to take on the caregiver role (Carmichael & Charles, 2003). The endogeneity of caregiving and labor supply has been explored in different contexts (e.g. Crespo, 2006; Heitmueller, 2007; van Houtven et al., 2013), with some finding that an assumption of exogeneity underestimates the effect of unpaid care on labor supply (Crespo, 2006), while others find the opposite (Heitmueller, 2007). In instances where there is an overestimation of this effect, it has been found to be minimal for higher intensity caregivers (Heitmueller, 2007).

Among previous studies exploiting SHARE data, trying to tackle the endogeneity issue, Bolin, Lindgren and Lundborg (2008) draw on the first wave (2004-2005). Their results suggest that when the decision to provide care is treated as exogenous, it is negatively associated with employment status and hours worked for both men and women with regional differences in the caregiving effect across Europe. Bolin et al (2008) employs an instrumental variables approach, but find no evidence of endogeneity, which leads them to conclude that OLS estimates should be preferred. Crespo and Mira (2014) draw on the first two waves of SHARE (2004-2007) and find a strong North-South gradient in the (positive) impact of parental ill health on the probability of unpaid caregiving among daughters, reflecting the availability of public care services and female labor force participation that vary across European regions. By extension, their results imply that aggregate employment loss ascribed to caregiving responsibilities are negligible in Central and Northern Europe, though notable in the South. Kolodziej, Reichert and Schmitz (2018) use SHARE data from waves 1 through 5 (2004-2013). They shift the focus from the caregiver to the care recipient, and exploit information on respondents' adult children and their employment outcomes, thereby including caregivers under 50. Through an instrumental variables approach, Kolodziej, Reichert and Schmitz (2018) find that informal caregiving has a sizeable negative effect on labor force

participation regardless of gender. When running the analyses by country groups, the authors trace these effects to Southern and Eastern European countries.

2.2 Knowledge gaps to be addressed

Based on our readings of both pan-European and country-specific studies on Europe, we identify four gaps in extant knowledge on the topic of the present paper. First, the causality of the relationship between informal care provision and employment status remains to be established. There is no consensus about whether working-age people who take on caregiving duties are more likely to drop out of paid employment or not, and neither is the extent to which people self-select into caregiving based on their previous work experience determined. Some studies treat caregiving as exogenous to previous work status (Arber & Ginn, 1995; Carmichael & Charles, 1998; Carmichael & Charles, 2003b; Carmichael et al., 2008; Bolin et al., 2008; Casado-Marín et al., 2011; King & Pickard, 2013). Others conclude that people with weaker labor market attachment are more likely to become caregivers (Crespo & Mira, 2014; Kolodziej et al., 2018; Carmichael & Charles, 2003a; Spiess & Schneider, 2003; Viitanen, 2010; Kotsadam, 2011; Ciani, 2012; Kotsadam, 2012; Schmitz & Westphal, 2017). The same applies for hours worked, for which evidence is even scarcer. Second, gender differences across Europe have not been clearly established. There is inconsistent evidence regarding employment and hours worked, mainly pointing towards effects being more pronounced for women than for men. More attention has been devoted to labor supply effects among women (e.g. Spiess & Schneider, 2003; Viitanen, 2010; Casado-Marín et al., 2011; Kotsadam, 2011). Men, nevertheless, form an important group of informal care providers in Europe, and will potentially become more important in the future as women's work orientation increases. Third, the question of country/regional differences has not been settled, though there is strong evidence of greater reductions in labor supply among caregivers in Southern Europe than elsewhere in Europe. Fourth, we know little about how the caregiving intensity mediates the relationship between unpaid caregiving and paid work in Europe.

This study builds on previous studies, such as Bolin et al., (2008) in the investigation of the provision of unpaid care to elderly parents and the effects on the caregiver's labor supply, both in terms of employment and hours worked. By addressing the knowledge gaps described above, we contribute to the literature in four ways. First, we use all available waves of SHARE, covering both a longer time period (2004-2015) and a larger population. By using the most recent SHARE data, we include a group of Eastern European countries in our analysis. Taken together, this does not only extend extant literature but may also produce more accurate estimates of the causal relationships of interest. We test for endogeneity in the data, addressing whether caregiving is exogenous to labor market outcomes or not, which is important to settle if the estimates are to be used for developing better policy measures that may counteract potential negative employment effects for unpaid caregivers. Second, we analyze both men and women, thereby providing additional evidence on gendered patterns in the effects of caregiving. Third, we highlight regional differences, including Eastern European countries that have been less explored. Fourth, we investigate caregiving as a less frequent activity as well as caregiving occurring more frequently (caregiving intensity). By taking this inclusive approach, we incorporate a significant portion of those who engage in unpaid caregiving, but nevertheless may be affected in terms of labor supply for reasons relating to worry for a parent who is becoming more dependent, or to stress experienced when making care arrangements, or travelling back and forth to care for the dependent parent.

2.3 Theoretical considerations
2.3.1 Economic theory

Our research is guided by economic time allocation theory. Time allocation models consider decisions on labor supply and care as interrelated because they compete for the caregiver's time, which is limited to a maximum of 24 hours per day. It has since long been understood that the standard labor/leisure model is inadequate for understanding the choice function for women with family responsibilities even when their involvement in paid work is extensive (Oi, 1992; Jacobsen, 2007; Kimmel & Connelly, 2007). Hence, those who have family and household responsibilities must trade off among three uses of time instead of two (Becker 1965; Gronau 1977; Graham & Green 1984). These are work, leisure, and home care, which make the choice about how to spend time, given opportunities and preferences, more complex, if more consistent with reality. What the best choice is depends on context and changes with economic conditions (e.g. relative earnings or transfers) and the life cycle (Becker & Ghez, 1975).

How men and women with caregiving responsibilities allocate their time between paid work, caregiving and other activities depends on options which vary according to individual, household and contextual factors. In economic time allocation models, individuals are assumed to rationally choose the optimal amount of time for different activities and the resources they need to maximize their utility subject to various constraints. They derive utility from different activities. Paid work render individuals earnings, status, self-esteem and independence. Individuals also derive utility or emotional satisfaction from household-produced goods and services including health and well-being of self and others (cf. Becker, 1974, 1981). The model predicts that individuals allocate their time so that an extra hour (on the margin) renders the same utility irrespective of whether it is spent in paid work, leisure or home care. The direction of the association between caregiving and labor supply is dependent on whether there is a dominant income or substitution effect. When faced with a family member's health shock, and individual can substitute unpaid work for paid work (thereby reducing labor force participation due to a substitution effect), increase paid work due to an income effect, or to a respite effect (Carmichael & Charles, 2003). The value of an hour of the caregiver's time spent in paid work can be measured by the wage rate or be proxied by the individual's level of education as a predictor of his/her earnings potential. The higher the earnings potential, the higher the opportunity cost of caregiving.

Within this framework, individuals are rational and unrestricted in their choices. In the case of caregiving one may suspect that individuals react emotionally, and not fully rational, when a need for care arises (e.g. in connection to an accident or a health shock), but that they adjust in the long run as they gain information about the costs and benefits of caregiving compared to other activities and various care arrangements at hand. It is also unlikely that individuals who face the choice between paid work, leisure and caregiving can realize any combination of these activities as lack of flexible work hours, income replacement programs, affordable and trustable care services, and help from others, likely restrict the decision.

Time allocation decision-making is often captured in models which treat households as a firm-like production units that pool resources through exchanges and efficiently allocates them to optimize its outputs.[1] Spouses are assumed to rationally choose the optimal amount of time for different activities, such as care and paid labor and the resources they need to maximize their utility subject to various constraints. Gender differences and gendered impacts of caregiving responsibilities are in line with economic theories of specialization and bargaining, related to differences in men's and women's earnings potential. According to

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[1] The primary conceptual framework that economists use to analyze people's allocation of time is Becker's (1965) household production model.

Becker's theory on comparative advantages, decisions on how to allocate family members' time in paid work or home work are taken by comparing the partners' marginal productivity in the labor market and in the home (Becker, 1981). The fundamental assumption is that the production and use of these outcomes requires purchases of goods and services from the market and time specifically devoted to their transformation; families as firms face alternatives regarding how inputs of goods and time are combined to generate the desired outcomes. Spouses can deploy different strategies to promote well-being ranging from large time inputs servicing and caring to benefit from the services of full-time professional care workers, whilst being constrained with respect to financial resources and time, and this is captured in the framework of specialization and trade. The typically higher male wage rate makes men specialize in paid work and women specialize in unpaid work, of which routine housework and care for others make up considerable portions. Marriage/cohabitation allows the pooling of time and money resources, which can be allocated to caregiving, purchase of care services, or both (Becker, 1973, 1985). Specialization, however, increases the productivity of individuals in both paid work and caregiving – often in a gendered way – and thus the tradeoff between caregiving and other activities will depend on gender and individual experiences of work and caregiving, and thus become stronger over time.

Becker's theories focused on the importance of differences in earnings potential, which accounts for the mid-20th century dominance of the male-breadwinner family model. In line with the growing participation of women in education and employment, later contributions resulted in more gender-neutral accounts of specialization theory (e.g. bargaining theory, Manser & Brown 1980, Lundberg & Pollak 1996, but see also Oppenheimer 1997). The division of unpaid labor within the family has been explained in terms of other processes as well (e.g. doing gender). The bottom line is that women as a group typically specialize in unpaid work while men specialize in paid labor.

Gender is commonly neglected in international research as caring is considered women's work (Gerstel & Gallagher 2001; Kramer 2004). It is, however, important to consider both men and women in order to better understand gender differences. Similarly, when it comes to the study of time allocation it is important to extend the original economic models to include unpaid work, and to distinguish between caregiving activities because some are easily linked to occasional help, routine activities (cooking, cleaning) while others involve altruism, emotions, and caring about the individual needing care (Becker 1976), or else differential skill sets or levels of effort (e.g. medical care or personal care) that commonly are gendered. Crespo and Mira (2014) propose a model for the relationship between employment and caregiving, in which adult daughters derive utility from parental welfare alongside with consumption and leisure when they care for their elderly parents. If this is higher for women than for men, daughters will reduce their labor supply in order to care for parents more than sons. This reasoning echoes with identity economics models (Akerlof & Kranton, 2000). IN line with such models, social norms and traditions impose restrictions on both men and women in their choices of paid work and unpaid caregiving.

2.3.2. Care in context
The above-mentioned theoretical considerations should be considered in context. Whilst the socio-demographic context for caring is similar across Europe, the policy contexts have important differences concerning private versus public spending, and policies targeting caring and the labor market, carers' well-being and financial assistance to carers. According to the *European Social Network* (2008), there are stark differences in the availability of formal care across European countries, with availability being much lower in Southern and Eastern

European countries compared to Nordic and Continental European countries. The policy context also impacts the costs, conflicts and tradeoffs relating to decisions on unpaid care and labor supply as well as the degree of gender inequality.

Esping-Andersen (1990) divides welfare systems into three social models: a Conservative model (comprising Continental Europe), a Liberal model (made up of Anglo-Saxon countries) and a Social Democratic model (including the Nordic countries). In Conservative countries' social rights are selective, and the family, together with the church and the workplace, are important welfare providers; in Liberal countries state provision of welfare is minimal, social rights are modest with strict entitlement rules, market dependence is high and the individual's position in the labor market is central in this respect; in Social Democratic countries the state is the main provider of general and universal welfare. The welfare state regime typology is a useful framework for exploring gender relations across contexts. The Social Democratic countries were early adopters of gender-neutral policies and the so-called dual-earner/dual-carer model. This model eases work-family conflicts across the life cycle by reducing constraints through leave programs with high levels of income replacement, reduced working hours for caregivers (notably parents but also more generally), family income support and publicly provided (highly subsidized) care facilities for children and the elderly (Gornick & Meyers, 2003; Bettio & Plantegna, 2004). These policies can increase female employment while also increasing men's involvement in unpaid domestic activities (Hook, 2006). Conservative and Liberal welfare states are more selective and less oriented towards reducing gender inequalities. They are more committed towards male breadwinning, resulting in a stricter gender division of labor with lower levels of female labor force participation and less involvement of men in unpaid domestic activities (Neilson & Stanfors, 2014). Compared to the Social Democratic countries, policies are restrictive in Liberal welfare states and generous yet gendered in Corporatist countries. Eastern European countries are not included in Esping-Andersen's original analysis, and are rarely included in comparative analysis, yet they form an interesting part of contemporary Europe. While they came from a situation with egalitarianism and gender equality as strong, ideology-based features, their transitions to market economy put the system under strain, dismantled the welfare state, and reduced many publicly provided services in favor of market alternatives (Heyns, 2005). For example, many women (especially those with low-paying jobs) dropped out of the labor force due to lacking care arrangements and large cuts in public services and social benefits (Pollert, 2003) despite increasing returns in the labor market. The Eastern European countries are nowadays characterized by low levels of generosity when it comes to work-family policies, in favor of familialism (Letablier et al., 2009). Though their exact position in the welfare state typology is not clear, yet this (rather heterogeneous) group of countries seems to have most in common with the Liberal regime type.

This has implications for the role of the family in care and the extent to which informal care services are relied upon (Bettio & Plantegna, 2004). While there is an extensive literature on welfare state typology and care strategies for children, those for the elderly have received less attention. Welfare state policies may support and/or supplement the family in different ways and to varying extents. Care for children, the sick, the disabled and the elderly is considered to be primarily a public responsibility, limiting family responsibilities, in the Social-Democratic welfare states. There is more reliance on family, the church and other communal institutes in Conservative states while market mechanisms are primarily used in the Liberal welfare states where the role of family is extensive but operates through different mechanisms than in the Conservative states in Continental Europe. It should be noted that the reliance on women for caregiving activities is universal. In the Social-Democratic states, many women provide

formal care through public sector employment while in other states care workers providing health and caring services are often employed in the private sector (cf. Ungerson 2003). In all countries women provide much informal caregiving, but in the Nordic welfare states, most women are relieved from much of their care responsibilities through the public organization of care and subsidized fees.

2.3.3 Hypotheses

Given these theoretical considerations, we expect informal care and paid work to be substitutes. This is also in line with empirical evidence (e.g. Bonsang, 2009; van Houtven & Norton, 2004; Pickard, 2012). As an individual allocates time to caregiving activities, less time will be allocated to paid work. He/she may even drop out of employment if care duties are incompatible with paid work. Because formal and informal care may also be substitutes, a dynamic may emerge whereby working individuals whose parent needs care actually increase work hours in order to pay for care services. In the empirical estimations, we control for the family context of individual caregivers, as theory suggests it plays an important role in the decisions of individuals and causes variation between families. We expect differences between men and women in the relationship between unpaid caregiving and paid work. Women may be more likely to become caregivers in the first place due to characteristics and comparative advantage within the families. We may also expect women who become informal caregivers to be more likely to reduce work hours or drop out of paid employment compared to their male counterparts, as social norms and traditions prescribe that they should allocate more time into caregiving duties. Men with caregiving responsibilities may have stronger incentives to stay in paid work, and face disincentives to perform unpaid care work. These effects may vary across countries. We expect to find large gender differences in countries with traditional gender norms, strong family ties, less general welfare state with more emphasis on familialism (e.g. Southern Europe), as this is correlated with an unequal division of labor between men and women. We expect less gendered patterns in the Northern European countries, which have comprehensive support systems, and a strong emphasis on gender equality. Continental European countries are generally more conservative than the Nordics, though more generous in welfare provision and support systems than Southern European countries. They are also more progressive when it comes to gender equality. It is less clear where the Eastern European countries place themselves, though them being in line with the Liberal regime type would make them more distinct than Northern and Continental Europe when it comes to gendered patterns in the tradeoff between paid work and unpaid care, but less distinct than Southern European countries.

3. Data and methods

3.1 Data

We use data from SHARE, which is a multi-disciplinary and cross-national panel covering more than 120,000 individuals aged 50 and above in 27 European countries and Israel. The data contain information on health-related variables, such as physical and cognitive functioning, mental health, and behavioral risks; indicators of socioeconomic status, such as employment and assets; as well as variables relating to social and family networks. The data are designed to capture the dynamic character of ageing across Europe.

We draw on data from waves 1, 2, 4, 5, and 6, for which interviews took place between 2004 and 2015. All countries are not, however, part of all waves. We follow Kolodziej et al. (2018) as we divide countries into four subgroups according to the share of LTC expenditures of

GDP, using data from OECD (2018).[2] The country groups are: High expenditure (>2% LCT expenditure of GDP), which includes Sweden, the Netherlands, Denmark, Switzerland, and Belgium; Medium expenditure (1-2%), including Austria, Germany, France, Ireland, and Luxembourg; Low expenditure, Southern Europe (<1%), which consists of Spain, Italy, Greece, Israel, and Portugal; and low expenditure, Eastern Europe (<1%), including the Czech Republic, Poland, Hungary, Slovenia, Estonia, and Croatia. This grouping aims to capture country variation originating from both differences in the availability of formal care and cultural norms regarding family and gender. Country groups and distributions are displayed in Table 1.

Table 1 here

We restrict the sample to men and women aged 50-64, who potentially all could be in the labor force, i.e. respondents who have not yet retired and who were not permanently sick or disabled. This group includes the self-employed, unemployed, and homemakers. We derive two dependent variables from the data; *Employment status* to capture the impact of unpaid caregiving at the extensive margin, and *Hours worked* (i.e. weekly working hours reported by the respondent, regardless of contractual hours, excluding breaks but including overtime) to capture caregiving impacts on the intensive margin when the caregiver adapts the workload to accommodate for time spent on unpaid care. Regressions on *Hours worked* are conditional on the respondent being employed (i.e. having positive working hours). The variable is transformed into its natural logarithm in order to obtain a more smooth distribution of observations (Wooldridge, 2012, p. 41).

The main explanatory variable is a *Caregiver* dummy, indicating if the respondent reports having provided personal care in the past 12 months to a parent, parent-in-law, or step-parent living in a different household. 'Personal care' refers to long-term regular help with getting out of bed, personal hygiene, or dressing. We limit the analysis to respondents who have at least one living parent, and thereby are potential caregivers. We also do not consider caregivers who cared for someone other than a parent, or who cared for a person living in the same household as the respondent. For carers, the data include information on the intensity of care, as respondents who reported providing informal care were asked to estimate how often they had provided unpaid care, i.e. whether it took place daily, weekly, monthly, or less often. Based on these answers, we employ three additional dummy variables that indicate the intensity of care; *Caregiver, daily; Caregiver, weekly;* and *Caregiver, monthly or less often*. Table 2 shows the frequency of caregiving as well as the distribution of intensities among the sample population. In turn, Table 3 gives descriptive statistics on employment and weekly hours worked by caregiving status and gander. Means and shares of dependent and independent variables used in the analysis are listed in Table 4.

Tables 2-4 here

Caregiving and work outcomes may be endogenous, in the sense that people may self-select into caring for their elderly parents based on unobserved characteristics relating to their labor market outcomes. For example, individuals with limited employment opportunities or weaker ties to the labor market may be more likely to take on care duties than others. Then, the decision to provide unpaid care and the decision to work for pay are jointly determined, making it difficult to disentangle the causal effect of caregiving on labor market outcomes.

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[2] In the case of Croatia, the LTC expenditure statistics come from the European Commission (2016).

For these reasons, we employ an instrumental variables approach to isolate the variation in the outcome variable that is related to unpaid caregiving, but not to the unobserved error term. The instruments include variables indicating whether or not the respondent's biological mother or father is in poor health, the reasoning being that having a parent with bad health increases the likelihood of unpaid care provision, but does not affect the individual's labor supply through any other channel.[3] Another instrument indicates whether the biological mother or father lives far (i.e. more than 100 km) away, as a respondent whose parent(s) does not live nearby should be less likely to engage in unpaid care. We also exploit two dummy variables indicating whether the respondent's biological mother or father, was deceased, reasoning that a parent no longer alive is not in need of care, and respondents with a deceased parent should therefore be less likely to become caregivers. Finally, we add measures for respondents' total number of brothers and sisters alive, respectively. The reason for including these variables as instruments is that having more siblings may be related to a decreased care burden as duties may be shared (Ettner, 1996).

3.2 Methods

We estimate OLS models with the dependent variable being either *Employment status (ES)* or *Hours worked (HW)*. In the former case, ES_i denotes employment status for individual i, while in the latter HW_i denotes hours worked. In both cases IC_i indiates whether the individual provided any informal unpaid care, X_i is a vector of demographic and socioeconomic characteristics, H_i is the health status of the respondent, I_c for unobserved, country-specific factors, and T_k are year fixed effects. ε_i is the residual error term.

$$ES_i = f(IC_i + X_i + H_i + I_c + T_k + \varepsilon_i) \tag{1}$$
$$HW_i = f(IC_i + X_i + J_i + H_i + I_c + T_k + \varepsilon_i) \tag{2}$$

We also estimate two-stage least squares regressions (2SLS, see Wooldridge 2012, p. 529) to account for potential endogeneity between unpaid caregiving and employment status or hours worked. A 2SLS estimator is used when the analysis features multiple instruments, and is obtained in two stages. The first step is to regress the endogenous explanatory variable on the chosen set of instruments, which creates fitted values of the regressor that have been "purged" of the unwanted simultaneity bias:

$$y_2^* = \pi_0 + \pi_1 z_1 + \pi_2 z_2 + \pi_3 z_3 \tag{3}$$

The coefficients are estimates as long as we do not know the true population parameters. In the second stage, the outcome variable of interest is regressed on the fitted values obtained from the first step, which produces consistent and unbiased estimates of the causal effect of interest:

$$y_1 = \beta_0 + \beta_1 y_2^* + \beta_2 X + u_1 + \beta_3 v_2 \tag{4}$$

Here, X represents a vector of exogenous covariates, with u_1 standing for the residual error and v_2 for the error that emerged in the first step.

In cases like the present study, where the model is endogenous and both dependent and key explanatory variables are limited, Angrist and Pischke (2008, p. 148) suggest employing a standard linear model estimated by a 2SLS procedure. In a related contribution, Angrist (2001) argues that conventional 2SLS estimates using a linear probability model in the first stage are consistent whether or not the first-stage conditional expectation function is linear. It

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[3] If the mother or father was deceased, the variable indicates not in need of any care.

is generally safer to use a linear first stage as opposed to fitting the data with a non-linear model. Thus, we use the "plain" 2SLS. The same procedure is applied to *Hours worked*.

4. Results

4.1 Unpaid caregiving and labor supply

First, we run OLS regressions to estimate the relationship of being a caregiver and employment status/hours worked on a general level. Table 5 shows regression results with *Employment status* as the dependent variable. The three panels show the same regressions being run on different subsamples of country groups, with the topmost panel showing results for all respondents, the second for women, and the lowest one for men. Coefficients of control variables are hidden for the sake of saving space, with full regression tables being available upon request.

Table 5 here

Somewhat surprisingly, columns 1 and 2 suggest that being a caregiver is associated with a significantly higher likelihood of being in paid employment in the group of countries with a high level of LTC expenditure ($\beta = 0.017$ for all, $\beta = 0.017$ for women, $\beta = 0.019$ for men). The result contrasts the expected, and we may therefore need a more detailed analysis to explain the pattern. When we run the same regression on working hours, with results presented in Table 6, we see a significant and negative relationship between caregiving and time spent in paid work. The effect can be traced to women in country groups *Medium* ($\beta = -0.051$) and *Low, South* ($\beta = -0.058$). This is in line with our expectations of paid work and caregiving being substitutes.

Table 6

In order to control for potential endogeneity, we employ our set of instrumental variables in the next step of our analysis. The instruments must have a clear effect on the causal variable of interest, the *Caregiver* dummy (Angrist & Pischke, 2008, p. 86). To test the first stage, we conduct OLS regressions of our set of instruments on the care provision dummy, with results shown in Table 7. The signs and the magnitudes of the coefficients appear logical; health status of parent(s) has a positive effect on caregiving likelihood, whereas parent(s) living far away, mother being deceased, and the number of alive siblings all have a negative effect on caregiving likelihood. Having a deceased father only has an effect for women, with the sign being positive; this would suggest that women become caregivers to their widowed mothers. The F-values from each regression exceed the commonly used rule-of-thumb value of 10, indicating that each regression has explanatory power over the *Caregiver* dummy. Based on these arguments, which Angrist and Pischke (2008, p. 157) have suggested for evaluating the strength of the first stage, we consider the relationship to be sufficiently strong for the instruments to be used in 2SLS estimation. However, a word of caution is in place here; as these estimates do not separate the different intensity levels of caregiving, we may not achieve meaningful results. As shown in Angrist and Pischke (2008, p. 156), such estimates may be attenuated towards zero when the monotonicity assumption is not fulfilled. Nevertheless, we present our results from IV estimation below.

Table 7 here

Results from 2SLS regressions of caregiving on employment status are shown in Table 8. We also perform Wooldridge's (1995) robust score test and a robust regression-based test, the

results from which are presented below the regression results. Statistically significant results suggest that the key variables should be treated as endogenous.

Table 8

At the pan-European level, there is only weak evidence of endogeneity regarding care provision and employment status, with regressions on subsamples of men and women suggesting that the reverse causality may apply only for women (although the latter is not significant). As for the subsamples of countries, we find statistically significant values for endogeneity tests for all respondents in country group *High* (F = 3.514) and women in country group *Medium* (F = 4.743). For the former group, the coefficient of *Caregiver* is negative but not statistically significant (β = -0.057). This suggests that while selection in to caregiving may take place for this group, people may not drop out of employment directly due to taking on caregiving responsibilities. For the latter country group, we find a negative effect that is significant at the 5 % level (β = -0.151, p < 0.05). Then, women in these countries are selected into caregiving based on their previous labour market status, and are also more likely to stop paid work when taking up caregiving duties compared to their non-caregiving counterparts.

As for hours worked, regression results as well as results from endogeneity tests are shown in Table 9. European-level results do not show a statistically significant pattern. There is, however, evidence of endogeneity that can be traced to women in country group *Medium* (F = 5.427, p < 0.05). The coefficient of *Caregiver* is significant and negative (β = -0.297, p < 0.01), suggesting that after controlling for endogeneity, we see a negative effect from caregiving on the working hours of this group.

Table 9 here

In sum, when looking at the relationship of being a caregiver and employment status or work hours without accounting for intensity, our OLS estimates suggest that caregivers in countries with high LTC expenditure levels are more likely to be in paid employment than non-caregivers. However, female caregivers in our countries that have medium or low levels of LTC expenditure and are located in Central or Southern Europe work shorter hours than non-caregivers. There is evidence of the relationship of work and caregiving being jointly determined for women in medium-expenditure countries; therefore, the 2SLS estimate of the effect of caregiving should be preferred for this group. Taking into account that 2SLS estimates may be biased towards zero if caregiving has heterogeneous effects on work, we take a closer look at how caregiving intensity moderates this relationship in the next section. Evidence for other countries and men varies, either showing weak evidence of differences between caregivers and non-caregivers, or even suggesting caregivers work more than their non-caregiver counterparts. Therefore, the following section attempts to shed more light on the importance of intensity for understanding the dynamics at hand.

4.2 Caregiving intensity and labor supply

Next, we run corresponding regressions so that the effect of caregiving is estimated for each level of intensity. Table 10 shows OLS estimations of caregiving intensity and employment status for subgroups of women and men, as well as countries. Results shown on the topmost panel suggest that, at the pan-European level, daily caregiving is negatively associated with the likelihood of being in paid employment (β = -0.054, p < 0.01). The coefficients are statistically significant when running regressions by country groups, with the exception of the group *Low, East*. As we separate women and men in the two lower panels, it becomes clear

that the effect is only present for women. Less intensive care provision appears to be positively associated with employment likelihood; care provided monthly or less often in country groups *High* and *Medium* shows evidence for statistical importance ($\beta = 0.040$, $p < 0.01$ in column 2, and $\beta = 0.028$, $p < 0.05$, column 3, topmost panel). An effect is also present for countries in group *Low, South* ($\beta = 0.033$, $p < 0.10$). As for weekly care, a positive relationship can be seen for countries in groups *Low, South* ($\beta = 0.032$, $p < 0.10$) and *Low, East* ($\beta = 0.028$, $p < 0.05$). The results appear statistically strongest when no separation between men and women is done. Results for weekly hours worked are shown in Table 11.

Tables 10-11 here

Here, column 1 shows a negative relationship between caregiving of all intensity levels and hours worked at the pan-European level. For the combined sample of men and women in column 1, both daily and weekly caregiving have negative coefficients ($\beta = -0.056$, $p < 0.01$ and $\beta = -0.017$, $p < 0.05$, respectively). Some variation can be seen in the sizes and significance levels of the coefficients when the sample is separated according to country groups and gender. An exception is given by the country group *Low, East*, whereby the majority of the coefficients have positive signs, although there is little statistical power.

Next, we perform an analysis of the first stage of our set of instruments on the three caregiving intensity dummies, with results shown in Table 12. All of the models appear to have sufficient explanatory power over the caregiving variables and the coefficients have expected signs. Again, we note that in the case where a respondent's father is deceased, the relationship to caregiving is positive for women, which suggests women become caregivers for their widowed mothers.

Table 12 here

Results from regressions of caregiving intensity on employment status are shown in Table 13. First, the endogeneity of caregiving appears to be dependent on gender and country group. At the pan-European level, the topmost panel shows support for the hypothesis of caregiving being endogenous ($F = 3.401$, $p < 0.05$). Only daily caregiving has a negative effect on employment status ($\beta = -0.692$, $p < 0.01$ in topmost panel), while care taking place weekly and monthly or less often is positively associated with the outcome variable of interest ($\beta = 0.451$, $p < 0.05$ and $\beta = 0.474$, $p < 0.05$, respectively). The statistical power of the estimates is weakened when the regressions are run on subgroups of countries and women and men. As for hours worked, results shown in Table 14 suggest that caregiving and time spent working may be endogenous for women in countries belonging to groups *Medium* and *Low, South* ($F = 2.872$, $p < 0.05$ and $F = 2.288$, $p < 0.10$), and that women who become daily caregivers in the former group subsequently reduce their working hours ($\beta = -0.969$, $p < 0.05$).

Tables 13-14 here

Thus, when accounting for the intensity of caregiving, our OLS estimates suggest only daily caregiving to have a negative relationship with employment status, and that caregivers who help a parent weekly or less often may, in fact, be *more* likely to have a job than their non-caregiver counterparts. The negative relationship of daily caregiving and employment status is statistically significant only for women, perhaps due to the general scarcity of male caregivers. When looking for evidence of endogeneity, we find that employment status and caregiving appear jointly determined in the Eastern European countries of our sample, and

that after controlling for it, there is a large negative effect of daily caregiving on employment. The same applies to a lesser extent for women in countries that have high levels of LTC expenditure, although caregiving taking place monthly or less often is positively associated with working. As for men, the evidence is only statistically significant at the pan-European level, suggesting that after controlling for endogeneity, daily care has a large negative effect on employment likelihood. Overall, the intensity analysis provides a clearer picture over the impact of caregiving over work outcomes, as a pattern of negative impacts can be seen between daily caregiving and employment, whereas less intensive caregiving appears to have an effect mainly at the intensive margin. As for work hours, we see a general pattern of both women and men who provide care either daily or weekly having lower working hours than their non-caregiver counterparts, although significance varies and no such evidence is present for Eastern European countries. The evidence also suggests that time spent in paid work and providing care may be jointly determined for women in countries that have medium levels of LTC expenditure, and that daily caregiving still has a large negative effect on work hours after controlling for the endogeneity.

5. Concluding discussion

Our analysis show that women are informal caregivers more often than men, and notably so when caregiving takes place often. Also, caregiving intensity is important in moderating the relationship of caregiving and work outcomes. While we have identified some patterns that were expected, such as the negative association of daily caregiving and employment status and a general tendency of caregiving being associated with less hours worked, the data reveal unexpected patterns that require a more comprehensive analysis.

Our analysis suggests that for certain groups, the decision of holding a job and providing informal care are jointly determined, and that a similar dynamic may also occur at the level of weekly work hours. This implies that a selection effect is in operation and that in many cases, caregiving may be taken on by persons with a relatively low attachment to the labor market. However, while the analysis on the extensive margin reveals a clear pattern for both men and women at the pan-European level, the results from estimations on subsamples are vaguer in terms of tracing the effects to specific countries. As for hours worked, evidence of endogeneity coupled with a negative relationship between caregiving and work is only found in the case of women providing daily care in countries with a moderate level of LTC expenditure. Another group for whom hours worked and caregiving appear endogenous consists of women in Southern European countries, but the difference between caregivers and non-caregivers is not statistically significant; therefore, we cannot conclude that our IV analysis supports the notion of caregiving duties leading to a reduction of time spent in paid work for this group. Taking into account OLS regression results, we may conclude that these people work less hours compared to non-caregivers, but the causal relationship is not evident.

Relating to this, our IV estimation that takes into account the intensity of caregiving would most likely benefit from a larger sample size. This would allow us to reduce bias in the estimates and consequently improve our understanding of the causal effects of caregiving on work outcomes, especially at the level of individual countries or country groups. In any case, our analysis shows clear support for the hypotheses that it is important to account for the intensity of caregiving when studying its effects on the labor supply of caregivers, as the effects depend on it especially at the extensive margin, and that at the intensive margin, caregivers tend to work less than non-caregivers. Next steps in the analysis may involve, for example, separating the self-employed from those with a paid job to see if the effect of taking on caregiving duties differs for these two groups. A worthwhile exercise would also be to

conduct a thorough investigation regarding hours worked and how they depend on the type of employment the respondent is engaged in. Finally, we will look into the dynamics of caregiving decisions and movements to and from self-employment, as this could be an important dimension for the relationships at hand.

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Table 1. List of countries, waves, and fieldwork times in SHARE, grouped by level of public spending in Long Term Care (LTC).

	Wave 1	Wave 2	Wave 4	Wave 5	Wave 6
High Long Term Care expenditure (>2% of Gross Domestic Product)					
Sweden	2004	2006/2007	2011	2013	2015
Netherlands	2004	2007	2011	2013	-
Denmark	2004	2006/2007	2011	2013	2015
Belgium	2004/2005	2006/2007	2011	2013	2015
Switzerland	2004	2006/2007	2011	2013	2015
Medium Long Term Care expenditure (1-2% of Gross Domestic Product)					
Austria	2004	2006/2007	2011	2013	2015
Germany	2004	2006/2007	2011/2012	2013	2015
France	2004/2005	2006/2007	2011	2013	2015
Ireland	-	2007	-	-	-
Luxembourg	-	-	-	2013	2015
Low Long Term Care expenditure (<1% of Gross Domestic Product), Southern Europe					
Spain	2004	2006/2007	2011	2013	2015
Italy	2004	2006/2007	2011	2013	2015
Greece	2004/2005	2007	-	-	2015
Israel	2005/2006	2009/2010	-	2013	2015
Portugal	-	-	2011	-	2015
Low Long Term Care expenditure (<1% of Gross Domestic Product), Eastern Europe					
Czech Republic	-	2006/2007	2011	2013	2015
Poland	-	2006/2007	2011/2012	-	2015
Hungary	-	-	2011	-	-
Slovenia	-	-	2011	2013	2015
Estonia	-	-	2010/2011	2013	2015
Croatia	-	-	-	-	2015

Note: Data on Long Term Care expenditure retrieved from the OECD (2018) and in the case of Croatia from the European Commission (2016).

Table 2. Summary statistics on caregiving status and intensity.

	Women		Men	
	Frequency	Share	Frequency	Share
Caregiver	6,325	0.32	3,549	0.24
How often provided care to a parent				
Almost/about daily	1,290	0.07	489	0.03
Almost/about weekly	2,566	0.13	1,272	0.09
Almost/about monthly or less often	2,469	0.13	1,888	0.13

Table 3. Descriptive statistics on employment and weekly hours worked by caregiving status and gender.

	Employed or self-employed								Hours worked per week[1]							
	Caregiver				Non-caregiver				Caregiver				Non-caregiver			
	Women		Men		Women		Men		Women		Men		Women		Men	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
High LTC expenditure																
Sweden	0.96	0.20	0.95	0.21	0.94	0.24	0.95	0.21	37.58	9.32	41.98	9.09	36.23	9.50	41.64	10.25
Netherlands	0.68	0.47	0.96	0.19	0.60	0.49	0.91	0.28	25.64	12.21	40.78	10.20	25.98	12.03	39.01	11.75
Denmark	0.92	0.28	0.95	0.21	0.90	0.30	0.94	0.23	34.60	8.61	39.80	9.81	35.08	8.27	40.41	8.77
Belgium	0.69	0.46	0.94	0.24	0.66	0.47	0.88	0.32	31.07	12.40	41.25	12.27	31.81	12.87	42.32	13.92
Switzerland	0.85	0.36	0.97	0.17	0.81	0.39	0.96	0.20	28.42	14.71	43.66	12.39	29.06	13.58	43.88	12.39
Medium LTC expenditure																
Austria	0.82	0.39	0.92	0.27	0.76	0.43	0.87	0.34	31.52	14.39	40.83	11.21	33.65	12.52	43.33	11.32
Germany	0.77	0.42	0.92	0.27	0.75	0.43	0.86	0.34	30.94	12.92	42.74	12.46	31.05	13.22	41.67	12.36
France	0.78	0.42	0.90	0.30	0.79	0.41	0.89	0.31	33.87	11.13	40.83	11.82	34.45	12.29	41.40	12.28
Ireland	0.72	0.46	1.00	0.00	0.57	0.50	0.85	0.36	31.03	9.10	45.00	11.08	28.09	15.56	47.31	16.48
Luxembourg	0.61	0.49	0.97	0.16	0.61	0.49	0.95	0.23	30.84	10.29	42.47	9.12	32.34	12.76	43.77	10.27
Low LTC expenditure, Southern Europe																
Spain	0.50	0.50	0.82	0.39	0.50	0.50	0.82	0.39	36.32	12.52	41.29	15.51	35.79	12.26	41.88	12.56
Italy	0.55	0.50	0.92	0.27	0.47	0.50	0.87	0.34	32.63	11.24	40.96	12.73	35.64	11.34	41.15	11.35
Greece	0.50	0.50	0.94	0.24	0.40	0.49	0.94	0.24	34.86	16.30	40.62	19.72	37.08	15.95	43.05	18.51
Israel	0.74	0.44	0.96	0.19	0.68	0.47	0.90	0.30	33.43	14.46	46.09	15.21	34.72	12.91	44.79	11.97
Portugal	0.58	0.50	0.76	0.44	0.53	0.50	0.73	0.45	22.18	19.62	33.06	17.80	29.47	19.56	32.84	21.27
Low LTC expenditure, Eastern Europe																
Czech Republic	0.91	0.29	0.95	0.23	0.90	0.30	0.93	0.26	40.27	8.99	44.13	10.03	40.84	8.59	44.41	11.96
Poland	0.74	0.44	0.88	0.33	0.71	0.46	0.82	0.39	41.02	12.76	41.48	11.83	38.69	12.12	44.95	12.81
Hungary	0.83	0.38	0.81	0.40	0.73	0.45	0.78	0.42	43.36	8.44	41.00	11.38	40.60	9.95	40.20	10.74
Slovenia	0.88	0.33	0.79	0.41	0.69	0.46	0.80	0.40	40.43	7.46	43.22	7.61	38.67	9.79	41.19	10.40
Estonia	0.90	0.30	0.90	0.30	0.92	0.27	0.87	0.33	39.44	7.73	42.44	11.55	37.94	9.11	40.71	8.32
Croatia	0.69	0.47	0.88	0.33	0.55	0.50	0.84	0.37	40.00	6.93	42.39	3.77	40.44	6.31	43.71	8.55
Total	0.76	0.42	0.93	0.26	0.69	0.46	0.89	0.32	33.67	12.22	41.69	11.93	34.50	12.30	42.04	12.51
Observations	6,325		3,649		13,371		11,270		4,877		3,369		9,323		9,901	

[1]Hours worked per week reported conditional on respondent being in paid employment or self-employed.

Note: Data on LTC from the OECD (2018) and from the European Commission (2016) in the case of Croatia.

Table 4. Descriptive statistics on dependent, independent, and instrumental variables.

	Share/Mean	S.D.
Dependent variables		
Employment status	0.79	
Weekly hours worked[1]	37.95	12.91
Independent variables		
Caregiver	0.29	
Caregiver, daily	0.05	
Caregiver, weekly	0.11	
Caregiver, monthly or less often	0.13	
Female	0.57	
Age	56.29	3.66
Married	0.40	
Cohabiting	0.02	
Years of education	12.18	4.52
Citizen in country of residence	0.96	
Number of children	1.85	1.40
Number of young children	0.06	0.31
Net household wealth in Euro[2]	32.63	60.00
Bad self-reported health	0.03	
Number of health conditions	0.92	1.09
Public sector employee[1]	0.18	
Sweden	0.06	
Netherlands	0.05	
Denmark	0.06	
Belgium	0.10	
Switzerland	0.07	
Austria	0.04	
Germany	0.08	
France	0.08	
Ireland	0.00	
Luxembourg	0.02	
Spain	0.08	
Italy	0.08	
Greece	0.06	
Israel	0.04	
Portugal	0.01	
Czech Republic	0.04	
Poland	0.01	
Hungary	0.01	
Slovenia	0.03	
Estonia	0.07	
Croatia	0.01	
Instruments		
Mother has bad health	0.12	
Father has bad health	0.05	
Mother lives far away	0.11	
Father lives far away	0.05	
Mother deceased	0.67	
Father deceased	0.84	
Number of brothers alive	1.12	1.23
Number of sisters alive	1.12	1.26
Observations	34,615	

[1]Conditional on respondent being in paid employment or self-employed.

[2]Net household wealth scaled by 10 000 for presentation.

Table 5. Results from OLS regressions of informal care provision on employment status.

All	Europe	High	Medium	Low, South	Low, East
Caregiver	0.010**	0.017***	0.002	0.007	0.003
	(0.004)	(0.006)	(0.010)	(0.011)	(0.010)
Observations	34,615	12,016	7,256	9,224	6,119
R-squared	0.178	0.150	0.106	0.256	0.116
Women	Europe	High	Medium	Low, South	Low, East
Caregiver	0.008	0.017*	-0.008	0.004	0.009
	(0.006)	(0.009)	(0.014)	(0.015)	(0.013)
Observations	19,696	6,760	4,134	5,340	3,462
R-squared	0.220	0.177	0.111	0.205	0.156
Men	Europe	High	Medium	Low, South	Low, East
Caregiver	0.014***	0.019***	0.016	0.006	-0.006
	(0.005)	(0.007)	(0.012)	(0.014)	(0.016)
Observations	14,919	5,256	3,122	3,884	2,657
R-squared	0.075	0.058	0.088	0.093	0.089

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Note: Regressions control for gender (top panel only), age, age squared, marital status, cohabiting status, years of education, citizenship, total number of children, number of young children, household wealth, respondent's health status, number of diagnosed health conditions, country fixed effects, and year fixed effects.

Table 6. Results from OLS regressions of informal care provision on hours worked, conditional on respondent being in paid employment or self-employed.

All	Europe	High	Medium	Low, South	Low, East
Caregiver	-0.021***	-0.014	-0.036***	-0.048***	0.014
	(0.006)	(0.009)	(0.013)	(0.017)	(0.010)
Observations	27,197	10,220	5,919	5,926	5,132
R-squared	0.117	0.165	0.139	0.068	0.034
Women	Europe	High	Medium	Low, South	Low, East
Caregiver	-0.025***	-0.015	-0.051***	-0.058**	0.019
	(0.008)	(0.013)	(0.019)	(0.023)	(0.013)
Observations	14,069	5,341	3,154	2,688	2,886
R-squared	0.111	0.130	0.057	0.041	0.024
Men	Europe	High	Medium	Low, South	Low, East
Caregiver	-0.011	-0.005	-0.019	-0.035	0.003
	(0.008)	(0.010)	(0.015)	(0.025)	(0.017)
Observations	13,128	4,879	2,765	3,238	2,246
R-squared	0.021	0.037	0.033	0.023	0.033

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Note: Regressions control for gender (top panel only), age, age squared, marital status, cohabiting status, years of education, citizenship, total number of children, number of young children, household wealth, respondent's health status, number of diagnosed health conditions, employment sector (private vs. public), country fixed effects, and year fixed effects.

Table 7. Results from OLS regressions of instruments on informal care provision status, by gender (first stage).

	Caregiver		
	All	Women	Men
Mother has bad health	0.159***	0.181***	0.122***
	(0.008)	(0.011)	(0.013)
Father has bad health	0.170***	0.184***	0.141***
	(0.013)	(0.017)	(0.020)
Mother lives far away	-0.061***	-0.072***	-0.048***
	(0.008)	(0.011)	(0.012)
Father lives far away	-0.042***	-0.044***	-0.043**
	(0.012)	(0.016)	(0.017)
Mother deceased	-0.073***	-0.084***	-0.061***
	(0.006)	(0.008)	(0.009)
Father deceased	0.013	0.023**	-0.004
	(0.008)	(0.011)	(0.012)
Number of brothers alive	-0.012***	-0.010***	-0.014***
	(0.002)	(0.003)	(0.003)
Number of sisters alive	-0.022***	-0.026***	-0.016***
	(0.002)	(0.002)	(0.003)
Constant	0.347***	0.379***	0.310***
	(0.008)	(0.011)	(0.011)
Observations	34,615	19,696	14,919
R-squared	0.035	0.043	0.025
F-test	147.3***	108.2***	44.73***

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Table 8. Results from 2SLS regressions of informal care provision on employment status.

All	Europe	High	Medium	Low, South	Low, East
Caregiver	-0.039	-0.057	-0.060	-0.001	-0.053
	(0.029)	(0.041)	(0.053)	(0.076)	(0.075)
Observations	34,615	12,016	7,256	9,224	6,119
R-squared	0.176	0.140	0.101	0.259	0.112
Endogeneity test, F-statistic	2.807*	3.514*	1.487	0.018	0.567
Women	Europe	High	Medium	Low, South	Low, East
Caregiver	-0.046	-0.050	-0.151**	0.007	-0.040
	(0.036)	(0.052)	(0.069)	(0.084)	(0.081)
Observations	19,696	6,760	4,134	5,340	3,462
R-squared	0.217	0.171	0.087	0.217	0.153
Endogeneity test, F-statistic	2.452	1.740	4.743**	0.000	0.377
Men	Europe	High	Medium	Low, South	Low, East
Caregiver	0.016	-0.027	0.125*	0.043	-0.168
	(0.046)	(0.054)	(0.076)	(0.139)	(0.143)
Observations	14,919	5,256	3,122	3,884	2,657
R-squared	0.075	0.050	0.066	0.096	0.057
Endogeneity test, F-statistic	0.002	0.736	2.128	0.086	1.357

Robust standard errors in parentheses, clustered by household.

*** p<0.01, ** p<0.05, * p<0.1.

Note: Regressions control for gender (top panel only), age, age squared, marital status, cohabiting status, years of education, citizenship, total number of children, number of young children, household wealth, respondent's health status, number of diagnosed health conditions, country fixed effects, and year fixed effects.

Table 9. Results from 2SLS regressions of informal care provision on hours worked, conditional on respondent being in paid employment or self-employed.

All	Europe	High	Medium	Low, South	Low, East
Caregiver	-0.011	0.018	-0.166**	0.021	0.053
	(0.038)	(0.053)	(0.075)	(0.125)	(0.071)
Observations	27,197	10,220	5,919	5,926	5,132
R-squared	0.117	0.164	0.123	0.067	0.031
Endogeneity test, F-statistic	0.064	0.376	3.087*	0.287	0.303
Women	Europe	High	Medium	Low, South	Low, East
Caregiver	-0.045	-0.008	-0.297***	0.106	0.101
	(0.048)	(0.072)	(0.109)	(0.115)	(0.080)
Observations	14,069	5,341	3,154	2,688	2,886
R-squared	0.110	0.130	0.006	0.024	0.013
Endogeneity test, F-statistic	0.178	0.010	5.427**	2.140	1.028
Men	Europe	High	Medium	Low, South	Low, East
Caregiver	0.046	0.092	-0.002	-0.084	-0.067
	(0.057)	(0.061)	(0.086)	(0.295)	(0.118)
Observations	13,128	4,879	2,765	3,238	2,246
R-squared	0.016	0.019	0.033	0.025	0.026
Endogeneity test, F-statistic	0.958	2.442	0.038	0.031	0.357

Robust standard errors in parentheses, clustered by household.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Note: Regressions control for gender (top panel only), age, age squared, marital status, cohabiting status, years of education, citizenship, total number of children, number of young children, household wealth, respondent's health status, number of diagnosed health conditions, employment sector (private vs. public) country fixed effects, and year fixed effects.

Table 10. Results from OLS regressions of the intensity of informal care provision on employment status.

All	Europe	High	Medium	Low, South	Low, East
Caregiver, daily	-0.054***	-0.074***	-0.061***	-0.042**	-0.018
	(0.010)	(0.020)	(0.022)	(0.019)	(0.020)
Caregiver, weekly	0.018***	0.011	0.002	0.032*	0.028**
	(0.006)	(0.009)	(0.014)	(0.017)	(0.013)
Caregiver, monthly or less often	0.030***	0.040***	0.028**	0.033*	-0.008
	(0.005)	(0.007)	(0.012)	(0.018)	(0.015)
Observations	34,615	12,016	7,256	9,224	6,119
R-squared	0.180	0.153	0.108	0.257	0.117
Women	Europe	High	Medium	Low, South	Low, East
Caregiver, daily	-0.048***	-0.075***	-0.074***	-0.041*	-0.001
	(0.013)	(0.026)	(0.028)	(0.022)	(0.025)
Caregiver, weekly	0.016*	0.011	-0.003	0.032	0.029*
	(0.009)	(0.013)	(0.019)	(0.023)	(0.018)
Caregiver, monthly or less often	0.032***	0.047***	0.023	0.034	-0.006
	(0.008)	(0.011)	(0.019)	(0.027)	(0.019)
Observations	19,696	6,760	4,134	5,340	3,462
R-squared	0.221	0.181	0.113	0.206	0.156
Men	Europe	High	Medium	Low, South	Low, East
Caregiver, daily	-0.020	-0.010	-0.013	-0.027	-0.047
	(0.015)	(0.025)	(0.032)	(0.033)	(0.032)
Caregiver, weekly	0.019**	0.021**	0.006	0.018	0.033
	(0.008)	(0.010)	(0.018)	(0.021)	(0.020)
Caregiver, monthly or less often	0.020***	0.021***	0.031**	0.013	-0.014
	(0.006)	(0.007)	(0.014)	(0.019)	(0.023)
Observations	14,919	5,256	3,122	3,884	2,657
R-squared	0.075	0.058	0.089	0.093	0.091

Robust standard errors in parentheses.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Note: Regressions control for gender (top panel only), age, age squared, marital status, cohabiting status, years of education, citizenship, total number of children, number of young children, household wealth, respondent's health status, number of diagnosed health conditions, country fixed effects, and year fixed effects.

Table 11. Results from OLS regressions of the intensity of informal care provision on hours worked, conditional on respondent being in paid employment or self-employed.

All	Europe	High	Medium	Low, South	Low, East
Caregiver, daily	-0.056***	-0.102***	-0.078***	-0.055*	0.022
	(0.014)	(0.029)	(0.029)	(0.031)	(0.016)
Caregiver, weekly	-0.017**	-0.002	-0.062***	-0.028	0.024*
	(0.008)	(0.012)	(0.020)	(0.024)	(0.014)
Caregiver, monthly or less often	-0.012	-0.009	-0.001	-0.064**	-0.003
	(0.008)	(0.010)	(0.016)	(0.029)	(0.018)
Observations	27,197	10,220	5,919	5,926	5,132
R-squared	0.117	0.166	0.141	0.068	0.034
Women	Europe	High	Medium	Low, South	Low, East
Caregiver, daily	-0.054***	-0.072**	-0.099**	-0.063	0.028
	(0.018)	(0.036)	(0.040)	(0.039)	(0.019)
Caregiver, weekly	-0.016	0.001	-0.066**	-0.045	0.028
	(0.011)	(0.018)	(0.027)	(0.031)	(0.017)
Caregiver, monthly or less often	-0.022*	-0.018	-0.015	-0.071	0.005
	(0.012)	(0.016)	(0.027)	(0.044)	(0.023)
Observations	14,069	5,341	3,154	2,688	2,886
R-squared	0.111	0.131	0.058	0.041	0.024
Men	Europe	High	Medium	Low, South	Low, East
Caregiver, daily	-0.040*	-0.108**	-0.016	-0.032	0.004
	(0.022)	(0.051)	(0.034)	(0.052)	(0.028)
Caregiver, weekly	-0.011	0.006	-0.064**	-0.017	0.020
	(0.011)	(0.014)	(0.029)	(0.038)	(0.024)
Caregiver, monthly or less often	-0.003	0.001	0.009	-0.054	-0.015
	(0.009)	(0.012)	(0.017)	(0.039)	(0.028)

Observations	13,128	4,879	2,765	3,238	2,246
R-squared	0.021	0.039	0.036	0.023	0.033

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Note: Regressions control for gender (top panel only), age, age squared, marital status, cohabiting status, years of education, citizenship, total number of children, number of young children, household wealth, respondent's health status, number of diagnosed health conditions, employment sector (private vs. public), country fixed effects, and year fixed effects.

Table 12. Results from OLS regressions of instruments on informal care provision, by caregiving intensity and gender (first stage).

	Caregiver, daily			Caregiver, weekly			Caregiver, monthly or less often		
	All	Women	Men	All	Women	Men	All	Women	Men
Mother has bad health	0.078***	0.102***	0.040***	0.062***	0.065***	0.054***	0.019***	0.014*	0.028***
	(0.005)	(0.008)	(0.007)	(0.006)	(0.009)	(0.009)	(0.006)	(0.008)	(0.010)
Father has bad health	0.057***	0.067***	0.039***	0.065***	0.078***	0.041***	0.048***	0.039***	0.061***
	(0.008)	(0.011)	(0.010)	(0.010)	(0.013)	(0.013)	(0.010)	(0.013)	(0.016)
Mother lives far away	-0.041***	-0.054***	-0.024***	-0.084***	-0.103***	-0.058***	0.064***	0.085***	0.035***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.007)	(0.010)	(0.011)
Father lives far away	-0.018***	-0.027***	-0.007	-0.036***	-0.038***	-0.035***	0.012	0.020	-0.001
	(0.004)	(0.006)	(0.005)	(0.006)	(0.009)	(0.008)	(0.010)	(0.014)	(0.016)
Mother deceased	-0.011***	-0.014***	-0.009**	-0.036***	-0.045***	-0.025***	-0.026***	-0.025***	-0.027***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.004)	(0.006)	(0.007)
Father deceased	0.010***	0.013**	0.006	0.014**	0.019**	0.005	-0.012*	-0.009	-0.015
	(0.004)	(0.006)	(0.005)	(0.006)	(0.008)	(0.008)	(0.006)	(0.008)	(0.009)
Number of brothers alive	-0.003***	-0.002	-0.005***	-0.005***	-0.004**	-0.006***	-0.004***	-0.004**	-0.004*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Number of sisters alive	-0.006***	-0.010***	-0.002**	-0.007***	-0.008***	-0.007***	-0.008***	-0.009***	-0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Constant	0.055***	0.069***	0.038***	0.138***	0.160***	0.112***	0.154***	0.150***	0.159***
	(0.004)	(0.005)	(0.004)	(0.005)	(0.008)	(0.007)	(0.006)	(0.008)	(0.009)
Observations	34,615	19,696	14,919	34,615	19,696	14,919	34,615	19,696	14,919
R-squared	0.023	0.032	0.011	0.018	0.022	0.014	0.010	0.013	0.008
F-test	67.42***	56.38***	14.52***	104.5***	74.89***	33.47***	37.80***	26.77***	12.90***

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Table 13. Results from 2SLS regressions of the intensity of informal care provision on employment status.

All	Europe	High	Medium	Low, South	Low, East
Caregiver, daily	-0.692***	-0.881*	-0.047	-0.974	-1.545*
	(0.264)	(0.509)	(0.246)	(0.765)	(0.839)
Caregiver, weekly	0.451**	0.176	-0.131	2.164	1.629*
	(0.204)	(0.164)	(0.198)	(1.673)	(0.877)
Caregiver, monthly or less often	0.474**	0.308	0.172	1.739	0.821
	(0.198)	(0.211)	(0.185)	(1.319)	(0.831)
Observations	34,615	12,016	7,256	9,224	6,119
R-squared			0.077		
Endogeneity test, F-statistic	3.401**	1.726	0.844	2.405*	4.671***

Women	Europe	High	Medium	Low, South	Low, East
Caregiver, daily	-0.650***	-0.886*	-0.206	-0.548	-0.876
	(0.232)	(0.464)	(0.227)	(0.640)	(0.669)
Caregiver, weekly	0.535**	0.270	-0.120	1.567	0.865
	(0.226)	(0.208)	(0.209)	(1.789)	(0.653)
Caregiver, monthly or less often	0.609***	0.527**	0.150	1.143	0.413
	(0.218)	(0.234)	(0.220)	(1.924)	(0.658)
Observations	19,696	6,760	4,134	5,340	3,462
R-squared			0.086		
Endogeneity test, F-statistic	4.715***	3.030**	1.590	0.869	1.436

Men	Europe	High	Medium	Low, South	Low, East
Caregiver, daily	-1.571**	-0.639	0.204	-1.174	-1.289
	(0.765)	(0.810)	(0.541)	(0.831)	(0.795)
Caregiver, weekly	0.750**	0.206	-0.026	1.488	1.132
	(0.330)	(0.134)	(0.305)	(0.905)	(0.863)
Caregiver, monthly or less often	0.529	-0.200	0.286	0.912	-0.391
	(0.388)	(0.351)	(0.266)	(0.663)	(0.652)
Observations	14,919	5,256	3,122	3,884	2,657
R-squared					
Endogeneity test, F-statistic	3.865***	1.641	1.092	2.303*	3.147**

Robust standard errors in parentheses, clustered by household.

*** p<0.01, ** p<0.05, * p<0.1.

Note: Regressions control for gender (top panel only), age, age squared, marital status, cohabiting status, years of education, citizenship, total number of children, number of young children, household wealth, respondent's health status, number of diagnosed health conditions, country fixed effects, and year fixed effects.

Table 14. Results from 2SLS regressions of the intensity informal care provision on hours worked, conditional on respondent being in paid employment or self-employed.

All	Europe	High	Medium	Low, South	Low, East
Caregiver, daily	-0.460	-0.127	-0.839*	-0.525	0.140
	(0.328)	(0.616)	(0.477)	(0.495)	(0.448)
Caregiver, weekly	0.279	0.047	0.294	1.139	-0.031
	(0.213)	(0.180)	(0.358)	(0.838)	(0.490)
Caregiver, monthly or less often	0.173	0.094	0.212	-0.018	-0.512
	(0.198)	(0.229)	(0.270)	(0.698)	(0.477)
Observations	27,197	10,220	5,919	5,926	5,132
R-squared	0.019	0.158			
Endogeneity test, F-statistic	0.739	0.253	1.641	1.178	1.454
Women	**Europe**	**High**	**Medium**	**Low, South**	**Low, East**
Caregiver, daily	-0.607*	-0.783	-0.969**	-0.595	0.121
	(0.317)	(0.742)	(0.467)	(0.681)	(0.342)
Caregiver, weekly	0.399	0.258	0.278	1.618	0.098
	(0.258)	(0.310)	(0.403)	(1.389)	(0.353)
Caregiver, monthly or less often	0.411*	0.488	0.298	-0.331	-0.093
	(0.238)	(0.329)	(0.333)	(1.311)	(0.447)
Observations	14,069	5,341	3,154	2,688	2,886
R-squared					0.006
Endogeneity test, F-statistic	1.642	1.245	2.872**	2.288*	0.440
Men	**Europe**	**High**	**Medium**	**Low, South**	**Low, East**
Caregiver, daily	-0.550	1.584	-0.865	-1.079	0.033
	(0.714)	(1.352)	(0.636)	(1.020)	(0.860)
Caregiver, weekly	0.387	0.071	0.472	0.826	-0.075
	(0.296)	(0.239)	(0.380)	(0.985)	(0.921)
Caregiver, monthly or less often	-0.039	-0.443	0.131	0.608	-0.681
	(0.314)	(0.463)	(0.293)	(0.901)	(0.520)
Observations	13,128	4,879	2,765	3,238	2,246
R-squared	-0.550	1.584	-0.865	-1.079	0.033
Endogeneity test, F-statistic	1.317	2.274*	0.993	0.555	1.651

Robust standard errors in parentheses, clustered by household.

*** p<0.01, ** p<0.05, * p<0.1.

Note: Regressions control for gender (top panel only), age, age squared, marital status, cohabiting status, years of education, citizenship, total number of children, number of young children, household wealth, respondent's health status, number of diagnosed health conditions, employment sector (private vs. public) country fixed effects, and year fixed effects.