

DISCUSSION PAPER SERIES

IZA DP No. 16615

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Gender Employment Gaps and the Use of  
Formal and Informal Care in Europe**

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## ABSTRACT

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# The “Demise of the Caregiving Daughter”? Gender Employment Gaps and the Use of Formal and Informal Care in Europe

We revisit the universality of the “caregiving daughter effect”, which holds that daughters tend to provide more care to their older parents than sons. Based on rich European data, we document evidence of such an effect in countries with large gender disparities in employment rates, where having daughters also depresses the demand for formal care. In contrast, we find evidence consistent with the “demise of the caregiving daughter” when exposed to narrower gender gaps, where there is no more daughters’ effect on formal care. These results point to a reconsideration of caregiving system design amidst the rise of female employment.

**JEL Classification:** I18, J14, J3

**Keywords:** informal care, formal care, daughters, caregiving daughter effect, gender employment gap, Europe, care substitution, social norms

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## 1. Introduction

The provision of adult care to older dependent individuals hinges on the availability of unpaid care, which is mainly provided by family members (Norton, 2016). When spouses are unavailable to supply care, the latter is commonly provided by children (Silverstein and Giarrusso, 2010) and traditionally, such a task has disproportionately fallen in the hands of middle-aged daughters (Bettio and Verashchagina, 2010; Arno et al., 1999; Tolkacheva et al. 2014), which gives rise to what we define as the “caregiving daughter effect”. Consistently, a growing body of research documents that the presence of a daughter is a strong predictor of both the availability of adult care (e.g., Horowitz, 1985; Grigoryeva, 2017), and the intensity of caregiving arrangements individuals receive (Van Houtven and Norton, 2004, 2008; Bolin et al. 2008; Bonsang, 2009; Urwin, Lau and Mason 2019).

Gender asymmetry in care provision responds to both gender differences in the opportunity costs of care and shifting social norms prescribing traditional female gender roles regarding the provision of care to older parents (Barigozzi et al. 2020). That is, exposure to large gender gaps in employment and wages depresses daughters’ employment aspirations, and in turn, reduces their opportunity costs of supplying care. In contrast, women’s exposure to higher employment opportunities and similar wages than men is likely to reduce the supply of care. The persistence of employment gaps shapes women’s labor market aspirations, specifically the, perceived “natural” responsibility of a daughter to provide care or the “caregiving daughter effect”.<sup>1</sup>

This paper investigates whether gender employment gaps either contribute to or at least amplify the "caregiving daughter effect". That is, we test whether we observe evidence of the so-

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<sup>1</sup> When social norms are internalized, a departure from it then gives rise to a social or cognitive cost (Akerlof and Kranton, 2000).

called “demise of the caregiving daughter”, namely evidence that sons are equally likely to provide care than daughters are, in countries exhibiting a narrow gender gap in employment.

One challenge in estimating the “caregiving daughter effect” is that reverse causality might bias the results. It is plausible that the provision of adult care explains gender employment gaps. However, the literature so far documents conclusive evidence of weak or negligible effect of caregiving on employment. More specifically, descriptive studies document evidence that intensive caregiving is negatively correlated with labor market participation (Carmichael and Charles, 2003, Lilly et al., 2007). However, causal estimates from Van Houtven et al. (2013) addressing reverse causality find small effects of caregiving on employment among male caregivers and some effect on the intensive margin among female caregivers, but *no effect on the extensive margin of employment*, which is the focus of this paper. Similarly, other empirical evidence suggests no causal effect of employment on care (Leigh, 2010). In contrast, Carmichael, Charles, and Hulme, (2010) document evidence that employment participation depresses the supply of adult care, and Nizalova (2012) documents that higher wages depress the supply of informal care.

Europe is a fertile setting where to examine caregiving and employment effects, both for its large cross-country heterogeneity in the employment rate of women accompanied by a general trend towards narrowing the gender employment gap, which makes it suitable to test the “caregiving daughter effect” (Eurostat, 2019).<sup>2</sup> Indeed, as we document later, gender employment gaps reveal large cross-country variation ranging from 3.5-4 percentage points in Scandinavian countries (such as Sweden or Finland) and 19.8 and 19.7 in Southern European countries such as Italy and Greece, respectively. One can then expect different behavioral responses to the supply of care by adult daughters depending on country specific labor markets conditions, and more specifically their opportunity costs of caregiving compared to men. If this is the case, we should

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<sup>2</sup> <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/EDN-20190307-1>

find that countries exhibiting low employment gaps, women face relatively higher opportunity costs of providing adult care, which we expected would reduce the “caregiving daughter effect”. Consistently with this relationship, some evidence documents that unemployment shocks in Europe increase the supply of informal care (Costa-Font et al, 2016). However, no previous study has documented a differential effect of the “caregiving daughter effect” according to gender gaps in local labor markets, nor the subsequent effects on the use of formal care among older parents. Given that previous studies have documented evidence of substitution between formal and informal care using the presence of a daughter as an instrument (Van Houtven and Norton, 2004, 2008; Bolin et al. 2008; Bonsang, 2009), another important point that this paper examines is whether the relevance of such as traditional instrument depends on the local gender employment gaps.

More specifically this study examines whether the effect of the sex composition of the children on the supply of unpaid care (to their parents) depends on the size of the national gender employment gaps. We also show that such effects modify the use of formal care, consistently with the so-called ‘care substitution’ hypothesis (Van Houtven and Norton 2004; Bonsang, 2009). The identification strategy relies on the assumption that the sex composition of the children is randomly distributed according to major sources of heterogeneity such as health, preferences, and abilities. We use data from the Survey of Health, Ageing and Retirement in Europe (SHARE) from 2004 through 2020, alongside Eurostat data on gender gaps in employment rates.

We contribute to the current literature in the several ways. First, we use rich harmonized data across European countries spanning for more than a decade to show that the “caregiving daughter effect” is not universal. Specifically, we show that such effect varies systematically with respect to the gender differences in employment rate across country and time, consistently with the ‘demise of caregiving daughter’ hypothesis. Second, we show that this ‘demise of caregiving daughter’ also has consequences for the demand for formal care and that it is sensitive to the type

of care (paid domestic care versus nursing care at home), consistent with previous literature (e.g., Bonsang, 2009). Third, we shed some light on the open debate concerning the interactions between informal and formal care by providing an important source of exogenous variation in the receipt of unpaid care, namely the proportion of daughters, and the heterogeneous effect on the supply of care (Bolin 2008; Van Houtven and Norton 2004). Finally, we consider a number of robustness checks including the effect of the potential confounders driving the female labor market gaps by exploiting country/time differences in the development of the service sector.

The structure of the paper is as follows. Section 2 below provides background for the paper. In Section 3, we outline the empirical strategy. Section 4 describes the data used for the analysis and Section 5 presents our main results. Section 6 reports several sensitivity analyses that test the robustness of our findings by using different model specifications and sample selection criteria. Finally, Section 7 offers some concluding remarks.

## **2. Related Literature**

### ***Incentives for women's supply of care.***

Financial incentives such as caregiving allowances can change the supply of care (Costa-Font et al, 2017). However, labor market conditions of potential caregivers can play a role in influencing *opportunity costs of care and* make a difference in the supply of care.<sup>3</sup> In examining the effect of female employment there are a series of relevant questions to consider.

The supply of unpaid care can, in theory, affect employment decisions, especially among low-skilled daughters who are, at the margin, indecisive about participating in the labor market. However, as argued before, the effect of informal care on labor market participation is

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<sup>3</sup> Similarly, transaction costs might play a role too, as daughters who live close-by are most likely to become caregivers (Dautzenberg et al. 2000).

inconclusive, and most empirical evidence suggests ‘no causal effect’ (Leigh, 2010). To date, estimates of the impact of informal caregiving on the extensive margin of labor supply are mostly descriptive or vary from a small significant and negative, to negligible and not different from zero (Crespo and Mira 2014, Ettner 1996, Michaud *et al* 2010, Pavalko and Artis 1997, Van Houtven *et al* 2013, Wolf and Soldo 1994). There is insufficient evidence to claim an effect on the extensive margin of employment participation (Lilly *et al*, 2007). Michaud *et al.* (2010), using British data and a dynamic model allowing for correlated time-invariant unobserved heterogeneity and initial sorting, found a negative and significant effect of co-residential caregiving on future employment for women but no significant effect of extra-residential care. Other studies, also considering the role of unobserved heterogeneity influencing caregiving and labor market decision, found negative effects (Carmichael *et al.* 2010). More recently, Van Houtven *et al.* (2013) found a negative effect at the internal margin in the United States. Crespo and Mira (2014), who focused on European women ages 50 to 60 years old, confirmed the negligible effects of informal care on employment in every region except for Southern Europe.

Finally, social incentives can play a role in influencing caregiving decisions, such as employment aspirations and gender norms (Farré and Vella, 2013), which influence an individual’s sense of responsibility for the care for older family members. Such incentives can hinge on both altruistic as well as time and money exchange motive<sup>4</sup>. For instance, one

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<sup>4</sup> Sloan *et al.* (1996, 1997) find evidence of altruism as adult children provide more informal care to parents who are unable to financially reward their efforts, though other studies find that there is evidence for similar levels of support from all children (MacDonald and Koh, 2003). Consistently, other studies indicate a significant and positive correlation between financial transfers to children and the supply of care consistent with exchange motivations (Norton *et al.* 2013 and Henretta *et al.* 1997).

explanation for the ‘caregiving daughter effect’ assuming an exchange of unpaid childcare for future informal care, is a more intense provision of childcare by the mother lineage (Uhlenberg and Hammill, 1998). However, such social incentives might slow moving, whilst changes in female employment conditions, can have a significant effect of the supply of care.

### ***Substitution between formal and informal care.***

An important feature in the examination of the effects of changes in the gender employment gap on caregiving is the substitution between informal and formal care. Van Houtven and Norton (2004, 2008) document that informal care substitutes for formal long-term care using child characteristics as instruments of informal care. Similarly, Bonsang (2009) finds evidence of the substitution for low-skilled care but not for nursing home care using the first wave of SHARE. However, the employment status of men and women are generally disregarded in these types of analysis due to endogeneity concerns. The role of gender employment gaps across countries and over time can help disentangle the existing heterogeneity in the related literature. More specifically, if we observe that changes in gender employment gaps alter caregiving arrangements toward more formal care, such evidence is indicative of the presence of substitution. This paper will contribute to this specific question.

### **3. Empirical strategy**

The aim of the empirical analysis is to measure the heterogenous effect of the proportion of daughters ( $share_{ict}$ ) – though we examine the effect of the number of daughters too- on the number of hours of informal care received per month ( $IC_{ict}$ ), as well as its impact on the probability of using formal care ( $FC_{ict}$ ) according to the gender employment gap of the sampled children across Europe and over time ( $gap_{ct}$ ). The equations to be estimated are the following:

$$IC_{ict} = \beta_{ct} + X'_{ict}\beta_1 + \beta_2share_{ict} + \beta_3share_{ict}gap_{ct} + \varepsilon_{ict}, \quad (1)$$

$$FC_{ict} = \gamma_{ct} + X'_{ict}\gamma_1 + \gamma_2share_{ict} + \gamma_3share_{ict}gap_{ct} + \nu_{ict}, \quad (2)$$

where  $X_{ict}$  is a vector of control variables that are likely to be related to the use of formal and informal care. It includes age and age squared, the level of education of the respondent defined according to the ISCED 1997, the number of limitations with the activities of daily living (ADL) and the number of limitations with the instrumental activities of daily living (IADL).  $\beta_{ct}$  and  $\gamma_{ct}$  are country-wave fixed effects that consider the unobserved heterogeneity across countries and across waves within each country.  $\beta_2$ ,  $\beta_3$ ,  $\gamma_2$ , and  $\gamma_3$  are the parameters to be estimated. Finally,  $\varepsilon_{ict}$  and  $\nu_{ict}$  are the error terms. Under the assumption that the error term is uncorrelated to  $share_{ict}$ ,  $share_{ict}gap_{ct}$ , and  $X_i$ , the parameters of interest can be estimated by Ordinary Least Squares.<sup>5</sup>

The gender composition of the children is a natural outcome that is randomly distributed with respect to major sources of heterogeneity such as preferences and abilities. We can thus plausibly argue that it is not related to the error term in the equations for informal and formal care. Additionally, the gender composition of the children can be argued to be exogenous, conditional on the number of children, given that the only way parents can influence the gender ratio of their children is by having more children. This identification strategy has also been used to identify the causal effect of informal care on formal care in papers written by researchers such as Lo Sasso and Johnson (2002), Van Houtven and Norton (2004, 2008), Charles and Sevak (2005), and Urwin, Lau and Mason (2019).

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<sup>5</sup> We also estimated the equations by using a tobit model for informal care and probit model for formal care. Results are robust to those alternative estimation methods.

The difference in the provision of informal care by sons and daughters is likely to vary across European countries and over time. For instance, the gender employment gap varies considerably across countries. We may therefore expect that the effect of having a daughter (instead of a son) on the receipt of informal care depends on the country of residence and time. We expect that the effect of having a daughter on informal care is larger in countries that have a larger gender employment gap. The model will control for country-year fixed effects to capture the unobserved heterogeneity across countries and over time. Finally, in a robustness section we consider a number of checks including the effect omitted variable bias or measurement error in estimating gender employment gaps using an instrumental variable strategy that explores the differential development of the service sector in each European country.

#### **4. Data**

##### ***The sample.***

The empirical analysis is based on the pooled data from waves 1, 2, 5, 6, 7 and 8 of the Survey of Health, Ageing and Retirement in Europe (SHARE).<sup>6</sup> Wave 3 is not used because this wave was devoted to a retrospective survey that did not include the information that is necessary for our analysis. Wave 4 is also discarded because there is no information on the use of formal care. Data from wave 1 and 2 in Switzerland, from wave 1 in Greece, and from wave 2 in Poland and Czech Republic are not utilized due to missing or unreliable data on the use of formal care.<sup>7</sup> SHARE

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<sup>6</sup> Since we pool the waves of SHARE, we have more than one observation for many individuals observed in the sample.

<sup>7</sup> Data are missing for all those countries-wave samples, except for Czech Republic in Wave 2 but the very low number of individuals that reported using paid domestic help raises suspicion on the

includes extensive information on health, employment, financial situation, family, and activities of a representative sample of the population aged 50 years and older in 28 European countries (Börsch-Supan et al., 2005, 2008).<sup>8</sup> The cross-country nature of these data provide a unique opportunity to test our hypotheses. The interviewed individuals come from the following countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and Switzerland. Data were collected using a computer-assisted personal interviewing (CAPI) program, supplemented by a self-completion paper and pencil questionnaire. For more details on the sampling procedure, questionnaire content, and fieldwork methodology, we refer readers to Börsch-Supan and Jürges (2005).<sup>9</sup>

For the following analysis, we restrict the sample to individuals aged 65 or above (171,343 observations) who have between one and four children (108,826 observations) and whose children are between 25 and 64 years old (103,674 observations). We only keep individuals who do not live with a partner or a spouse (33,294 observations) because the information about the receipt of informal care is requested from the individual and/or the spouse or partner, rendering it impossible to clearly identify who is benefiting from the care. We also remove individuals who live with at least one of their children (leaving 28,888 observations), as the information about informal care is

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reliability of the data. Nevertheless, a robustness check using them in the analytical sample showed that their inclusion does not significantly affect our results.

<sup>8</sup> Israel is also part of SHARE, but we discard this country for our analysis. Nevertheless, a sensitivity check show that the inclusion of Israel in our analysis does not affect our results.

<sup>9</sup> More information can be found on the SHARE website: <http://www.share-project.org/>.

only available for extra-household care.<sup>10</sup> We also exclude individuals from the sample who are employed (leaving 28,268 observations). Individuals living in a nursing home are removed from the sample as well (leaving 27,339 observations). We only keep individuals who report that they have been limited because of a health problem in activities people usually do (15,893 observations), as they are more likely to be in need for care. Finally, we discard observations with missing values for the variables of interest and the controls. The final analytical sample includes 15,634 observations.

*The measure of informal care.*

Informal care is measured as any form of care and assistance received by the respondents from all of their children.<sup>11</sup> In SHARE, informal care includes personal care (e.g. dressing, bathing or showering, eating, getting in or out of bed, and using the toilet), practical household help (e.g. home repairs, gardening, transportation, shopping, and household chores), and help with paperwork (e.g. filling out forms, and settling financial or legal matters). The measure of informal care is derived from three questions that describe the relationship with the caregiver (if any), the frequency (daily, weekly, monthly or less often) of the care received, and the average number of

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<sup>10</sup> We also estimated the models by including them in the analytical sample, results remain consistent with our main results.

<sup>11</sup> In SHARE, information regarding informal care providers is collected for only up to three potential informal caregivers. So, if the respondents have more than three children who provide them care, it is possible that our variable of informal care underestimates the amount of informal care received from all the children.

hours of care received per day/week/month/year, respectively.<sup>12</sup> Following Bolin, Lindgren, and Lundborg (2008) and Bonsang (2009), we transform these variables into a measure of the average total number of hours of informal care provided by the children per month: if the respondents answered that they received informal care almost every day, we multiplied the number of hours received on a typical day by 30; if the informal care was received almost every week, the number of hours per week was multiplied by 30/7; if informal care was received on a monthly basis, the number of hours per month was left unchanged; finally, if the respondents answered that they received informal care less often than monthly, they were asked to give an estimate of the total number of hours of informal care received over the past year and we divided this amount by 12. However, from the fourth wave of SHARE onwards, the average number of hours of informal care was not asked anymore. As a result, we impute an average number of hours for each reported frequency of care received based on the information available in the first two waves of SHARE. On average, a child providing daily (resp. weekly, monthly, yearly) informal care to his parent provides 120 (resp. 25, 7, 2) hours of care per month. When the parent reports receiving care from a child but does not know the frequency, we impute the weighted average number of hours of care received by a child. To remain consistent across waves, we use this method to impute the amount of informal care provided by the children for all waves, including the first two waves even if we

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<sup>12</sup> For the observations where the average number of hours per day/week/month/year is missing or clearly unreliable (for instance, when the individual reports receiving more than 18 hours of care per day from one caregiver), we have imputed the sample average of the number of hours of care received from the child for the corresponding frequency (daily/weekly/monthly/yearly). When the frequency is missing, we have imputed the sample average number of hours of care received per month from the child.

have the actual amount for those waves. Table 1 presents the average number of hours of informal care that parents receive per month from the children by country and waves.

**[Table 1 about here]**

*The measure formal care.*

We consider the utilization of three types of formal home care available in SHARE: paid domestic help, nursing care at home, and meals-on-wheels. In the first two waves of SHARE, respondents were asked to report the number of weeks and the average number of hours per week that they received either paid or professional home help which they could not perform due to health problems or paid or professional nursing or personal care during the twelve months preceding the survey. They were also asked whether they receive meals-on-wheels if they could not prepare meals themselves due to health problems. However, since the fifth wave of SHARE, the respondents are only asked whether they received paid domestic care, nursing care, or meals-on-wheels rather than the intensive margin for paid domestic help or nursing care at home.<sup>13</sup> As a

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<sup>13</sup> Note that the questions for the use of formal care have slightly changed from wave 5 onwards. In wave 1 and 2, the question was: “During the last twelve months, did you receive in your own home: 1. Professional or paid nursing or personal care; 2. Professional or paid home help, for domestic tasks that you could not perform yourself due to health problems. 3. Meals-on-wheels”. From wave 5 onwards, the question is: “During the last twelve months, did you receive in your own home any professional or paid services listed on this card due to a physical, mental, emotional or memory problem? 1. Help with personal care (e.g. getting in and out of bed, dressing, bathing and showering). 2. Help with domestic tasks (e.g. cleaning, ironing, cooking). 3. Meals-on-wheels (e.g., ready-made meals provided by a municipality or a private provider)”

result, our analysis is restricted to the use of formal care at the extensive margin. Tables 2 presents the proportion of individuals who report receiving any kind of formal care by country and wave.

**[Tables 2 about here]**

*Gender employment gap across countries and waves.*

The data about the employment rates of men and women aged between 25 and 64 years old by country and year come from the Eurostat dataset and are estimated using the EU Labor Force Survey.<sup>14</sup> We match those data to the data from SHARE according to the country of residence of the respondent and the wave during which the interview took place. The gender employment gap is defined as the difference between the employment rate of men and the employment rate of women. To check whether the gender employment gaps across countries and over time from Eurostat matches the observed gender employment gap of the children of the respondents from SHARE, we use the available information from SHARE about the labor market status of the respondents' children.<sup>15</sup> In the first two waves of SHARE, information on labor market status was drawn for all children of respondents with four children or less. When respondents had more than four children, information about the labor market status of the children was only drawn for four of the children based on whether they were under the working age of their country of residence, their geographical proximity, and their year of birth. From the fourth wave, the question is posed to all children. This is the reason why we decided to include only individuals who have up to four

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<sup>14</sup> [https://ec.europa.eu/eurostat/web/products-datasets/-/lfst\\_r\\_lfe2emprt](https://ec.europa.eu/eurostat/web/products-datasets/-/lfst_r_lfe2emprt)

<sup>15</sup> When doing the comparison, we do not use the seventh wave as this information was not collected during that wave.

children in the analysis.<sup>16</sup> The employment rate of daughters by country and wave is calculated by taking the sum of all daughters whose respondents reported them as being employed and dividing it by the count of all daughters. The same calculation is made for respondents' sons. The gender employment gap among children at the country-wave level is defined as the difference in the employment rate of sons and the employment rate of daughters at the country and wave level. We found that the correlation between the measure of the gender employment gap from SHARE and from Eurostat is equal to 0.874. Table 3 reports the gender employment gap from Eurostat across countries and waves. As expected, we observe large variations in the gender employment gap across countries and over time. Moreover, we also observe that this gap tends to shrink over time.

**[Table 3 about here]**

### ***Control variables.***

The equations to be estimated also include a limited number of control variables. We include age and age squared to appropriately consider that the need for care increases with age. We also include several controls for need such as the number of limitations with the activities of daily living and the number of limitations with the instrumental activities of daily living. The level of education is included and classified according to the ISED-1997 classification. We also control for the gender of the parent and for the number of children.

## **5. Results**

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<sup>16</sup> The percentage of individuals with more than 4 children is 5.7% in our sample. A sensitivity checks including them in the sample shows that results are not affected by their inclusion in the analytical sample.

### ***Baseline results.***

We begin our analysis by reporting the estimated coefficients from equations (1) and (2) using Ordinary Least Squares in Table 4. Estimates suggest that the proportion of daughters is unrelated to the number of hours of informal care received from the children *when there is no gender gap in the employment rate*. Similarly, it suggests that the proportion of daughters is unrelated to the receipt of paid domestic care and nursing care. However, *when the gender gap in employment is large, a larger proportion of daughters gives rise to the receipt of more informal care and, to less formal care*. Indeed, the estimated coefficient of the interaction term between the share of daughters and the gender employment gap on informal care is, as expected, positive and significantly different from zero at the 1 percent level. Consistently, when we examine the receipt of any type of formal care (including paid domestic care, nursing care, and meals-on-wheels), the estimated coefficient of the interaction term is negative and significantly different from zero at the 5 percent level. For paid or professional domestic help, it is also negative and significant at the 10 percent level, while it is not significantly different from zero at any conventional level regarding nursing care and meals-on-wheels. These results suggest that, consistently with our hypothesis, the effect of having a daughter on the receipt of informal care is highly dependent on female labor market participation (employment gender gaps), which in turn exerts an influence on the uptake of formal care. Figures 1 and 2 illustrate our main results by showing the relationship between the effect of the proportion of daughters on the number of hours of informal care received from the children (resp. the probability to receive any formal care for Figure 2) and the gender gap in employment rate across countries and waves. It confirms the results presented in Table 4 and they show that the results are not driven by outliers or one specific country.

**[Table 4 and Figures 1 and 2 about here]**

### *Gender of care receivers.*

Next, we investigate whether these results are sensitive to the gender of the care receiver, namely for mothers and fathers. Lee, Dwyer, and Coward (1993) demonstrated that while both fathers and mothers are commonly looked after by their daughters, the tendency is even stronger when it comes to mothers. Recent evidence, as indicated by Leopold et al. (2014), further supports the notion of a primary bond between mothers and daughters. Table 5 reports the coefficient estimates for the proportion of daughters and its interaction with the gender employment gap when regression equations (1) and (2) are estimated separately for mothers and fathers. The results suggest that the receipt of adult care from the respondents' daughters differs by the gender of the respondent and that *our previous results are mainly driven by mothers*.<sup>17</sup>

Consistently with the “caregiving daughter effect”, we do find that the number of hours of informal care received by older mothers depends on the presence of daughters, and that this effect is highly sensitive to the gender employment gap. Moreover, we find that, when the gender employment gap is larger, the presence of daughters affects the receipt of paid domestic care, and, to a lesser extent, nursing care. The coefficient estimates of the interaction term between the proportion of daughters and the gender employment gap are negative and significant at the 5 percent level for paid domestic care and at the 10 percent level for nursing care. For men, the estimated coefficients of the interaction term are imprecisely estimated due to smaller sample size, preventing drawing any conclusion for men.

**[Table 5 about here]**

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<sup>17</sup> Note that the sample size for fathers is much smaller than for mothers, which explain the lack of precision of the estimates for fathers.

### *Changing gender employment gap over time.*

Our baseline analysis has explored the variations in the gender employment gap across countries and over time to investigate the relationship between the proportion of daughters and the receipt of different types of care. In this section, we extend our previous analysis by exploring whether variations over time in the country-specific gender employment gap are related to variations in the effect of the proportion of daughters on long-term care arrangements. This is important as it would be consistent with the hypothesis that long-term care arrangements are changing over time due to the change in the gender employment gap over time. To do this, we augment our previous equations by including an interaction term between the proportion of daughters and the country dummies. The coefficient estimate of the interaction term between the proportion of daughters and the gender employment gap is therefore identified only through variations in the gender employment gap over time within countries.

Results are reported in Table 6 and suggest that while all estimates are much less precise than our main results, their point estimates remain remarkably close to the previous results exploiting both cross-country variations and variations over time. While we must remain cautious given the lack of precision, it suggests that our main results are not only driven by the cross-country differences in the gender employment gap but also by variations in the gender employment gap over time within countries.

**[Table 6 about here]**

### *Endogeneity of the gender employment gap.*

One important question is where the variations in the gender employment gap across countries and, more importantly, across time within countries come from. The cross-country variations are

often claimed to be derived from differing social norms. Women have a lower employment rate in countries with more traditional gender norms (Alesina et al, 2013). The increasing labor force participation of women observed in many countries is often claimed to be partly due to the rise of the service economy, at the expense of agriculture and manufacturing sectors. In this section, we first document that the change in the gender employment gap over time within countries is highly related to the rise of the service sector. We use the proportion of workers in the service sector among men (defined as the number of men employed in the service sector divided by the total number of men employed) to measure the importance of the service economy for each country and over time. We prefer this measure instead of the share of the total workers working in the service sector because any increase in the employment of women due to changes in norms or opportunity costs for women could result in an increase in the share of people employed in the service sector. This is because women are more likely to join the service sector instead of the good-producing sector.<sup>18</sup> We define the service sector according to the NACE classification, and the measures are obtained from Eurostat. The good-producing sector includes Agriculture, forestry and fishing; Mining and quarrying; Manufacturing; Electricity, gas, steam, and air conditioning supply; Water supply, sewerage, waste management, and remediation activities; and Construction. All the other sectors are defined as part of the service industry.<sup>19</sup>

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<sup>18</sup> Nevertheless, we cannot exclude the possibility that a raise of women's employment raises the demand for the service sector as the time spent doing housework needs to be outsourced and thus raises the employment in the service sector relative to the industrial sector for both men and women. We expect that such a reverse causal effect to be minimal.

<sup>19</sup> It includes Wholesale and retail trade, repair of motor vehicles and motorcycles; Transporting and storage; Accommodation and food service activities; Information and communication; Financial and insurance activities; Real estate activities; Professional, scientific and technical

Table A1 presents the share of employed men who are working in the service sector across countries and waves. It varies from 43.5 percent in Romania in 2020 (in wave 8) to 83 percent in Luxemburg in the same year. As expected, the proportion of men working in the service sector increased over time for most countries. The largest change over time took place in Spain where the proportion of men employed in the service sector increased from 53 percent in 2004 to 64 percent in 2020. Among the countries participating in SHARE, the importance of the service sector was the smallest in Eastern Europe, probably since they faced communism during the 20<sup>th</sup> century. At the same time, the political system of Eastern Europe expanded employment to everybody, women included, to a degree that rendered the gender gap in these countries relatively smaller than in other European countries. Given the specificity of Eastern countries, it is important to take this into account for our empirical analysis. Indeed, as shown in Table A2, we see that the relationship between the importance of the service sector and the gender employment gap becomes apparent only when we distinguish former communist European countries from the other European countries.

Table 7 reports the results of estimation of equations (1) and (2) using the share of workers in the service sector among men, instead of the gender gap in employment rate, interacted with the proportion of daughters and adding interaction terms between each explanatory variable and the dummy variable indicating if the country is an Eastern European country or not. Estimates are consistent with our baseline results. That is, for mothers, the proportion of daughters increases the

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activities; Administrative and support service activities; Public administration and defense, compulsory social security; Education; Human health and social work activities; Arts, entertainment and recreation; other services activities; Activities of households as employers, undifferentiated goods – and services – producing activities of households for own use; Activities of extraterritorial organizations and bodies.

hours of informal care received from their children, especially in countries that exhibit a low share of workers in the service sector among men. In contrast, the opposite is found when we examine the effect on paid domestic help and to a lesser extent for nursing care.

Next, Table 8 displays the results of the two-stage least squares (2SLS) estimator considering the interaction term between the share of daughters and the gender employment gap as endogenous and using the interaction term between the share of daughters and the share of workers in the service sector among men as an instrument. Results are again consistent with our main results. The endogeneity test does not reject the null hypothesis that the interaction term between the share of daughters and the gender employment gap is exogenous at the 5 percent level regarding the informal care and each of the formal care equations.

**[Table 7 and 8 about here]**

## **6. Robustness checks**

### ***Number of daughters instead of the proportion of daughters.***

An alternative specification to our baseline model consists of using the number of daughters and its interaction term with the gender employment gap rather than the proportion of daughters. Table 9 reports the results from this alternative specification with such a measure, and estimates reveal that our results are robust to this alternative specification except for nursing care. That is, we find that the effect of one additional daughter on the probability of informal care, controlling for the total number of children, is not significantly different from zero when the gender employment gap is equal to zero. However, the interaction effect with the gender employment gap is positive and highly significant, especially for mothers. These results suggest that if the gender employment gap is equal to 30 percent (corresponding to the gender employment gap in Greece in 2006 (Wave 2)), one additional daughter, instead of a son, would increase the number of hours of informal care

received from the children by about 6.5 hours per month (for mothers). Other results reported in Table 9 also show that it would result in an approximate 6.1 percentage point decrease in the use of any formal care. The results for nursing care reveal evidence of some sensitivity to the model specification. When using the number of daughters instead of the proportion of daughters, the estimate related to the interaction term with the gender employment gap is not significantly different from zero at any conventional level.

**[Table 9 about here]**

### ***Sample selection.***

To test the sensitivity of our results to alternative sample selection, we also estimate the model by using a less restrictive sample selection. First, we relax the condition that individuals must live without a spouse or a partner in the household. Table A3 in appendix shows the results based on this larger sample of individuals. It confirms our main results, namely that the presence of daughters only increases the supply of informal care and the use of formal care (e.g., nursing care or home care) when the gender employment gap is large. We note however that the effects of the interaction term between the proportion of daughters and the gender employment gap are smaller regarding the receipt of informal care and the use of paid domestic help but remain significant, especially for mothers. Those results are explained by the stronger reliance of their partner for the provision of care among such a sample. It might also suggest some precision loss given that the receipt of informal care is measured with error at the household level, as we cannot clearly distinguish caregiver and receiver.

Another issue is that we excluded from the analysis the older parents who are living with one of their children, which may cause sample selection bias. We excluded them because it is not

possible to measure the amount of informal care provided within the household. As a robustness check, we included those individuals in our sample and arbitrarily imputed 30 additional hours of monthly informal care received by those individuals. Results from this alternative sample are consistent with the main results of this study. Results are reported in Table A4 in the Appendix.

***Measuring gender gaps in employment from our survey sample.***

So far, our estimates take advantage of both cross-country and time variations in gender employment gaps by using official gender employment gaps estimates provided by Eurostat. As mentioned previously, this variable is highly correlated with the gender gap in employment rate (at the country-wave level) retrieved from the employment status information of the children reported by the respondents of SHARE. In contrast, the measure from Eurostat is based on a different population than the one we draw to measure caregiving in SHARE as the latter refers to individuals who have at least one parent is still alive. Table A5 reports the results using such alternative measure for the gender employment gap, and it shows that our results are robust to its inclusion.

***The exogeneity of the proportion of daughters.***

One potential issue is that the proportion of daughters might not be completely exogenous given that parents with a preference for a daughter may continue to have children until they are successful (the so-called ‘endogenous fertility’ effects). If the preference for daughters is related to preferences for formal and informal care, the estimated error term of the equations may be correlated to the proportion of daughters. To test for this hypothesis, we estimated the equations by 2SLS and by using the gender of the eldest child as an instrument for the proportion of daughters and the gender of the eldest child interacted with the gender employment gap for the interaction

term between the proportion of daughters and the gender employment gap. The estimates from the 2SLS estimator are consistent with our main results (although less precisely estimated), and the endogeneity tests do not reject the hypothesis that the proportion of daughters is exogenous. Results are reported in Table A6 in the Appendix.

*The effect of having daughters and sons on long-term care arrangement according to the employment rate of men and women.*

Up until now, the analysis used the gender gap in employment and the proportion of daughters (or the count of daughters, considering the number of children) to test whether daughters contribute more than sons, particularly in situations with a larger gender gap in employment. However, these findings could align with the idea that women offer less care as they engage in more work, but also with the notion that men provide more care when they work less. To explore this possibility, we employ a more flexible model that includes as explanatory variables the number of daughters and its interaction with the employment rate of women, as well as the number of sons with its interaction with the employment rate of men. Table A7 in the appendix presents the estimates for the entire sample, as well as for mothers and fathers separately. Consistent with our hypothesis, we find that the number of sons and the associated interaction term are not significantly different from zero at any conventional level for any type of care, while the opposite is true for the number of daughters and its associated interaction term. These results affirm that the earlier findings are influenced by women.

## **7. Concluding remarks**

The supply of informal care on behalf of daughters (and the provision of formal care) is not independent of country-specific gender employment gaps faced by prototypical caregivers. In this

paper, we provide strong evidence in favor of the hypothesis that the gender composition of family members supplying informal care depends on the country-specific gender gaps in employment.

Given that the backdrop strategy in most empirical strategies examining the effect of caregiving on outcomes use the presence of daughters as an instrument, we add to the literature on the role of gender employment gaps by showing that the effect of daughters on the supply of care is not a universal finding. Instead, it is dependent on the gender employment gap at the country-level. Consistently, we find that the effect of daughters on the supply of care is highly significant in countries with large gender employment gaps but insignificant in countries without such a gap. Furthermore, we also show that it affects the receipt of formal care, supporting the hypothesis that informal care is a substitute for formal care. We can interpret the effect of daughters on the receipt of formal and informal care as causal effects since the probability of having a daughter or a son is largely random.

While our results provide empirical support for the hypothesis that the gender employment gap affects long-term care arrangement, it is also possible that this association is driven by social norms concerning traditional gender roles. In countries where the prevailing norm is that women are expected to take care of the family and the household while men work in the labor force, women are less likely to work and more likely to take care of older parents. The latter might be the result of a default social norm. Consistently, in such cases, an exogenous increase in female labor force participation might not necessarily imply a decrease in the supply of informal care if social norms remain constant. Future research is warranted to identify the role of the labor market and social norms on long-term care arrangements.

Although the supply of informal care from the adult daughters is by far the most common form of old age care, the supply of such care is sensitive to the presence of female employment gaps. This study shows that the increasing labor market participation among daughters will increase the demand for formal care. Therefore, we expect that the current efforts toward closing

the gender employment gap might lead to an expansion in the demand for long-term care and long-term care expenditures.

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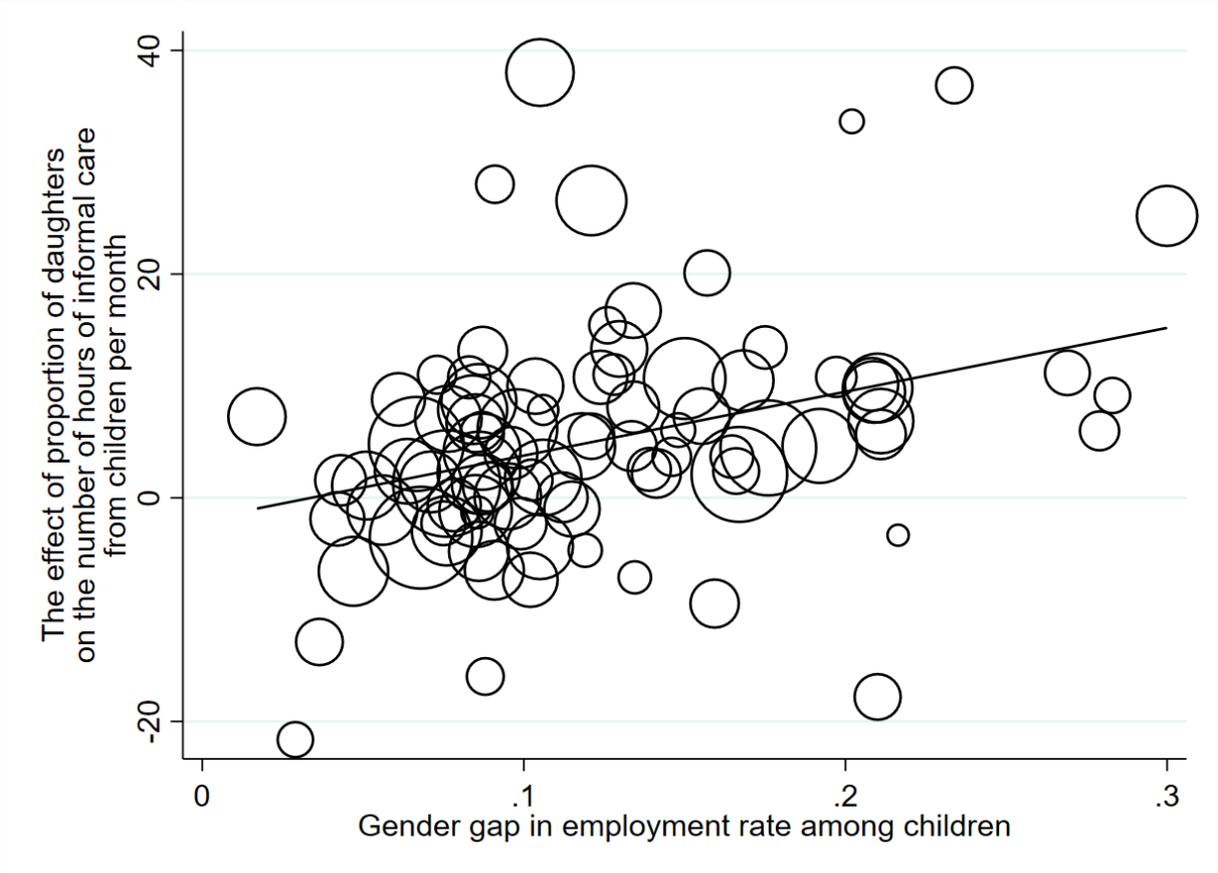
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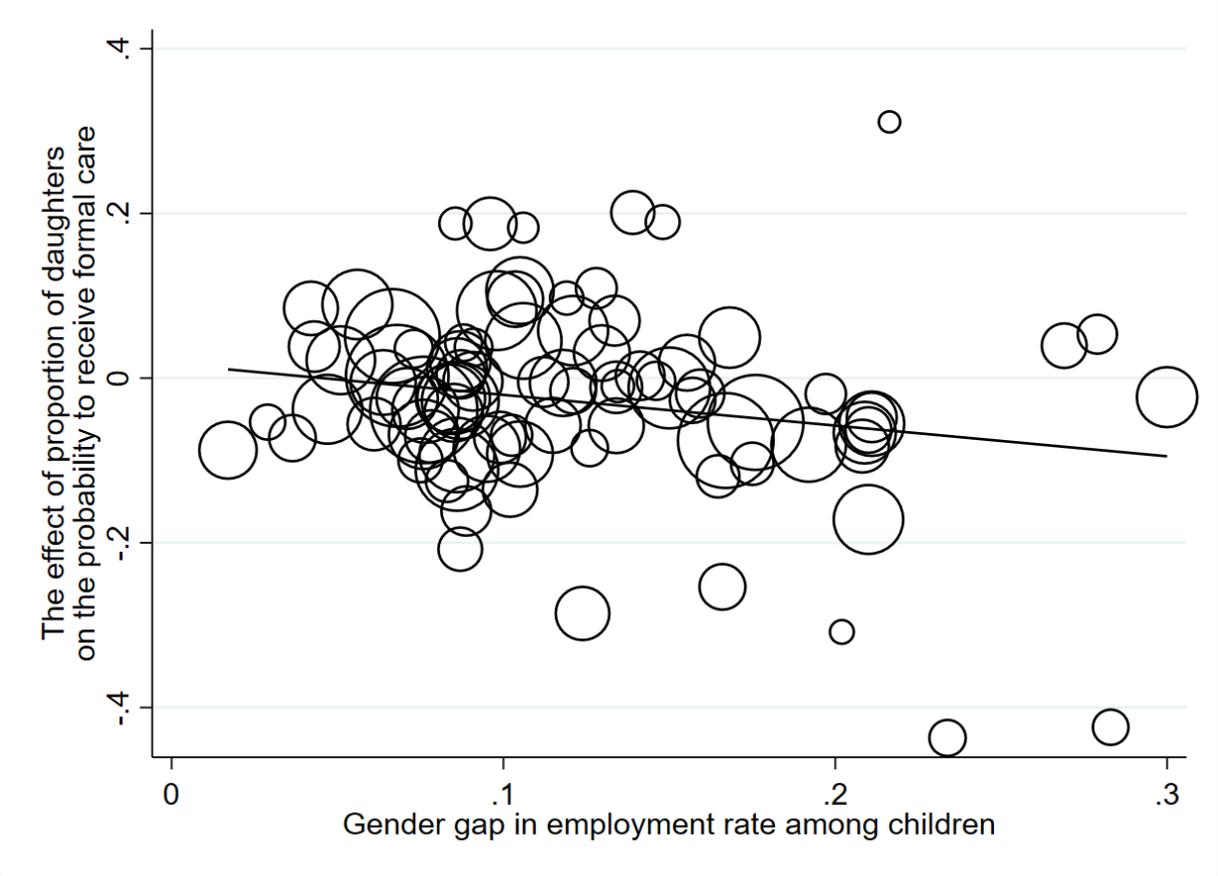
# Figures

**Figure 1. The relationship between the effect of proportion of daughters on the number of hours of informal care per month and the gender gap in employment rate (25–64-year-old) at the country/wave level.**



Notes: This figure shows the relationship between the OLS estimates of the effect of proportion of daughters on the number of hours of informal care per month received by the children and the gender gap in employment rate (25–64-year-old) at the country/wave level.

**Figure 2. The relationship between the effect of proportion of daughters on the probability to receive formal care and the gender gap in employment rate (25–64-year-old) at the country/wave level.**



Notes: This figure shows the relationship between the OLS estimates of the effect of proportion of daughters on the probability to receive formal care and the gender gap in employment rate (25–64-year-old) at the country/wave level.

# Tables

**Table 1. Average number of hours of informal care received per month from the children.**

	Wave 1	Wave 2	Wave 5	Wave 6	Wave 7	Wave 8
Austria	17.9	16.7	15.4	15.9	30.5	14.9
Belgium	20.7	20.5	16.5	10.5	18.0	15.3
Bulgaria						18.2
Croatia				17.6		16.3
Cyprus						19.0
Czech Republic			32.5	24.2	27.9	22.9
Denmark	11.1	8.4	10.7	8.0	6.8	5.6
Estonia			19.7	18.1		14.1
Finland						12.1
France	25.1	15.3	8.3	9.2	8.8	8.7
Germany	19.2	18.3	22.6	15.2	18.1	14.8
Greece		34.0		28.3	18.6	22.9
Hungary						9.5
Ireland		32.8				
Italy	19.7	23.2	29.3	20.4	28.6	16.2
Latvia						9.4
Lithuania						11.1
Luxembourg			7.6	11.1		12.9
Malta						1.1
Netherlands	9.9	6.8	8.5			8.1
Poland				14.1	13.2	14.7
Portugal				8.2		
Romania						12.5
Slovakia						11.6
Slovenia			21.4	29.5		18.4
Spain	21.8	38.0	41.5	35.7	37.2	25.1
Sweden	7.9	8.6	5.1	5.0	4.8	4.8
Switzerland			8.5	7.3	9.8	5.6

Note: This table reports the average number of informal care hours provided by children in the SHARE sample by country and sample wave.

**Table 2. Proportion of individuals receiving formal care.**

	Wave 1	Wave 2	Wave 5	Wave 6	Wave 7	Wave 8
Austria	22.5%	22.8%	34.3%	38.8%	33.3%	32.0%
Belgium	52.6%	49.1%	46.2%	48.5%	51.3%	49.2%
Bulgaria						11.5%
Croatia				12.5%		17.2%
Cyprus						47.2%
Czech Republic			21.1%	15.1%	18.9%	19.1%
Denmark	48.5%	52.0%	45.1%	40.0%	36.0%	37.2%
Estonia			23.7%	10.0%		6.4%
Finland						12.7%
France	43.8%	47.5%	43.8%	39.9%	34.1%	35.2%
Germany	17.2%	31.5%	31.6%	28.6%	29.0%	25.4%
Greece		12.7%		23.5%	25.0%	19.5%
Hungary						23.7%
Ireland		39.3%				
Italy	11.5%	11.7%	19.6%	24.8%	23.1%	29.5%
Latvia						4.5%
Lithuania						7.6%
Luxembourg			43.1%	41.2%		40.4%
Malta						27.3%
Netherlands	46.2%	45.4%	47.2%			48.4%
Poland				12.6%	1.3%	7.5%
Portugal				25.7%		
Romania						7.2%
Slovakia						12.5%
Slovenia			6.8%	10.6%		10.0%
Spain	28.1%	26.9%	31.4%	35.4%	35.3%	39.2%
Sweden	24.0%	22.8%	22.8%	26.4%	28.6%	22.6%
Switzerland			30.8%	36.2%	28.3%	29.7%

Note: This table reports the proportion of individuals receiving any type of formal care in the SHARE sample by country and sample wave.

**Table 3. Gender gap in employment rates among children.**

	Wave 1	Wave 2	Wave 5	Wave 6	Wave 7	Wave 8
Austria	13.4%	14.1%	9.8%	8.7%	9.1%	9.1%
Belgium	16.8%	15.5%	10.6%	8.6%	10.2%	8.6%
Bulgaria						8.7%
Croatia				9.6%		10.2%
Cyprus						13.4%
Czech Republic			17.6%	16.7%	15.7%	15.0%
Denmark	8.7%	8.9%	7.1%	8.7%	7.5%	7.8%
Estonia			6.8%	7.6%		6.7%
Finland						2.9%
France	13.0%	11.5%	8.6%	7.6%	8.3%	7.7%
Germany	13.4%	13.3%	10.5%	9.5%	8.8%	8.4%
Greece		30.0%		19.2%	21.1%	20.9%
Hungary						16.5%
Ireland		20.2%				
Italy	27.9%	26.9%	21.1%	21.0%	21.0%	20.8%
Latvia						3.6%
Lithuania						1.7%
Luxembourg			14.8%	12.6%		8.6%
Malta						21.6%
Netherlands	17.5%	16.6%	11.8%			10.4%
Poland				13.9%	14.6%	15.9%
Portugal				7.3%		
Romania						19.7%
Slovakia						11.9%
Slovenia			8.5%	8.5%		6.4%
Spain	28.3%	23.4%	10.5%	12.1%	12.8%	12.4%
Sweden	4.2%	6.1%	5.6%	4.7%	4.3%	5.1%
Switzerland			12.1%	11.2%	10.6%	9.9%

Note: This table reports the gender gaps (%) in employment rates among individuals aged 25-64 by country and sample wave. Source: Eurostat.

**Table 4. The effect of proportion of daughters and gender employment gap on care delivery (informal care, formal care, paid domestic care, nursing care and meals-on-wheels)**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
Proportion of daughters	-1.781 (1.470)	0.015 (0.022)	0.011 (0.022)	-0.002 (0.014)	-0.004 (0.008)
Proportion of daughters x gender employment gap	53.927*** (11.433)	-0.347** (0.166)	-0.310* (0.155)	-0.115 (0.085)	-0.020 (0.068)
Gender (woman=1)	2.888*** (0.699)	-0.018 (0.012)	-0.005 (0.010)	-0.005 (0.009)	-0.040*** (0.007)
Age	0.449 (1.668)	0.020 (0.013)	0.012 (0.014)	-0.016*** (0.005)	-0.004 (0.010)
Age <sup>2</sup>	-0.000 (0.011)	-0.000 (0.000)	-0.000 (0.000)	0.000*** (0.000)	0.000 (0.000)
Number of ADL	0.401 (0.453)	0.024*** (0.005)	0.024*** (0.004)	0.054*** (0.007)	0.000 (0.002)
Number of IADL	8.030*** (0.578)	0.068*** (0.011)	0.058*** (0.010)	0.038*** (0.005)	0.040*** (0.008)
ISCED97: Level 0 or 1	Ref.	Ref.	Ref.	Ref.	Ref.
ISCED97: Level 2 or 3	-0.935 (1.139)	0.047*** (0.013)	0.046*** (0.013)	0.001 (0.006)	0.012** (0.005)
ISCED97: Level 4. 5 or 6	-2.566* (1.381)	0.074*** (0.014)	0.075*** (0.017)	0.001 (0.007)	0.014 (0.009)
Number of children	3.417*** (0.533)	-0.006 (0.004)	-0.009** (0.004)	-0.001 (0.003)	-0.001 (0.003)
Intercept	-35.412 (64.478)	-1.039* (0.525)	-0.751 (0.564)	0.551** (0.210)	0.067 (0.385)
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.170	0.229	0.215	0.226	0.115
N	15,634	15,634	15,634	15,634	15,634

Note: This table reports the regression estimates of the proportion of daughters on several forms of adult care, including informal care, formal care, paid domestic care, nursing care, and meals-on-wheels according to the gender employment gap in Europe. Cluster-robust standard errors (at the country level) are reported in parentheses. The gender employment gap is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.

**Table 5. The effect of proportion of daughters and gender employment gap on care delivery for mothers and fathers.**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
	Mothers				
Proportion of daughters	-3.763** (1.578)	0.026 (0.023)	0.027 (0.024)	0.000 (0.016)	0.002 (0.006)
Proportion of daughters x gender employment gap	65.390*** (9.105)	-0.500** (0.194)	-0.476** (0.185)	-0.163* (0.090)	-0.031 (0.059)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.171	0.233	0.218	0.224	0.112
N	12,460	12,460	12,460	12,460	12,460
	Fathers				
Proportion of daughters	7.292** (3.441)	-0.054 (0.070)	-0.083 (0.071)	-0.020 (0.030)	-0.032 (0.024)
Proportion of daughters x gender employment gap	-6.366 (37.521)	0.503 (0.609)	0.618 (0.658)	0.179 (0.169)	0.038 (0.173)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.189	0.242	0.232	0.262	0.145
N	3,174	3,174	3,174	3,174	3,174

Note: This table reports the regression estimates of the proportion of daughters on several forms of adult care, including informal care, formal care, paid domestic care, nursing care, and meals-on-wheels according to the gender employment gap in Europe. Cluster-robust standard errors (at the country level) are reported in parentheses. The gender employment gap is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.

**Table 6. The effect of proportion of daughters and gender employment gap on care delivery (with country fixed effects and daughter proportion interactions)**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
	All				
Proportion of daughters x gender employment gap	52.782 (37.643)	-0.506 (0.791)	-0.570 (0.662)	-0.176 (0.322)	0.122 (0.130)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects x Proportion of daughters	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.172	0.230	0.216	0.227	0.116
N	15,634	15,634	15,634	15,634	15,634
	Mothers				
Proportion of daughters x gender employment gap	71.526 (57.846)	-0.782 (0.703)	-0.819 (0.569)	-0.289 (0.283)	0.017 (0.132)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects x Proportion of daughters	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.173	0.234	0.220	0.226	0.113
N	12,460	12,460	12,460	12,460	12,460
	Fathers				
Proportion of daughters x gender employment gap	-29.149 (77.681)	1.055 (1.602)	1.030 (1.387)	0.364 (0.728)	0.537 (0.626)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects x Proportion of daughters	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.202	0.253	0.242	0.271	0.154
N	3,174	3,174	3,174	3,174	3,174

Note: This table reports the regression estimates of the proportion of daughters on several forms of adult care, including informal care, formal care, paid domestic care, nursing care, and meals-on-wheels according to the gender employment gap in Europe. Cluster-robust standard errors (at the country level) are reported in parentheses. The gender employment gap is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.

**Table 7. The effect of having daughters according to the share of workers in the service sector among men on care delivery considering share of workers in the service sector and Eastern Europe for all, mother, and fathers.**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
All					
Proportion of daughters	30.757*** (9.962)	-0.241 (0.169)	-0.251 (0.165)	-0.074 (0.079)	-0.066 (0.071)
Proportion of daughters x Eastern country	-8.536*** (2.899)	0.056 (0.042)	0.069 (0.043)	0.016 (0.020)	-0.003 (0.018)
Proportion of daughters x share of workers in the service sector among men	-39.794** (15.380)	0.337 (0.263)	0.348 (0.253)	0.091 (0.125)	0.103 (0.115)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.171	0.235	0.224	0.240	0.116
N	15,634	15,634	15,634	15,634	15,634
Mothers					
Proportion of daughters	37.011*** (12.956)	-0.442** (0.188)	-0.478** (0.186)	-0.191** (0.073)	-0.071 (0.051)
Proportion of daughters x Eastern country	-9.330*** (3.187)	0.112** (0.047)	0.130** (0.050)	0.044** (0.017)	-0.001 (0.016)
Proportion of daughters x share of workers in the service sector among men	-50.933** (20.509)	0.633** (0.287)	0.692** (0.281)	0.269** (0.120)	0.118 (0.080)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.173	0.240	0.228	0.240	0.114
N	12,460	12,460	12,460	12,460	12,460
Fathers					
Proportion of daughters	2.628 (25.032)	0.538 (0.432)	0.689 (0.443)	0.341* (0.191)	-0.048 (0.217)
Proportion of daughters x Eastern country	-3.431 (7.645)	-0.176 (0.105)	-0.193* (0.109)	-0.092* (0.050)	-0.016 (0.048)
Proportion of daughters x share of workers in the service sector among men	8.381 (38.099)	-0.810 (0.675)	-1.081 (0.690)	-0.527* (0.292)	0.042 (0.358)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.193	0.249	0.242	0.271	0.146
N	3,174	3,174	3,174	3,174	3,174

Note: This table reports the regression estimates of the proportion of daughters on several forms of adult care, including informal care, formal care, paid domestic care, nursing care, and meals-on-wheels according to the share of workers in the service sector among men in Europe. Cluster-robust standard errors (at the country level) are reported in parentheses. The share of workers in the service sector among men is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.

**Table 8. The effect of having daughters on care delivery (2SLS).**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
	All				
Proportion of daughters	-3.293 (3.710)	0.047 (0.053)	0.046 (0.052)	0.004 (0.027)	0.022 (0.032)
Proportion of daughters x Eastern country	-2.112 (1.829)	0.001 (0.014)	0.013 (0.015)	0.001 (0.010)	-0.019* (0.011)
Proportion of daughters x gender employment gap	73.301*** (28.211)	-0.621 (0.428)	-0.641 (0.438)	-0.168 (0.214)	-0.189 (0.249)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
Exogeneity test (p-value)	0.218	0.434	0.360	0.848	0.500
N	15,634	15,634	15,634	15,634	15,634
	Mothers				
Proportion of daughters	-6.360 (4.710)	0.097* (0.056)	0.111* (0.065)	0.038 (0.033)	0.030 (0.022)
Proportion of daughters x Eastern country	-0.993 (1.963)	0.009 (0.023)	0.016 (0.027)	-0.000 (0.013)	-0.020** (0.008)
Proportion of daughters x gender employment gap	91.229*** (33.060)	-1.135*** (0.419)	-1.240** (0.487)	-0.482* (0.270)	-0.211 (0.192)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
Exogeneity test (p-value)	0.240	0.059	0.073	0.232	0.331
N	12,460	12,460	12,460	12,460	12,460
	Fathers				
Proportion of daughters	9.967 (8.443)	-0.171 (0.155)	-0.258 (0.175)	-0.121 (0.098)	-0.011 (0.095)
Proportion of daughters x Eastern country	-4.670 (4.587)	-0.056 (0.063)	-0.033 (0.072)	-0.014 (0.035)	-0.023 (0.022)
Proportion of daughters x gender employment gap	-17.503 (74.830)	1.692 (1.205)	2.258* (1.335)	1.101 (0.938)	-0.087 (0.734)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
Exogeneity test (p-value)	0.883	0.253	0.171	0.244	0.883
N	3,174	3,174	3,174	3,174	3,174

Note: This table reports the regression estimates of the proportion of daughters on several forms of adult care, including informal care, formal care, paid domestic care, nursing care, and meals-on-wheels according to the gender employment gap in Europe. Cluster-robust standard errors (at the country level) are reported in parentheses. The gender employment gap is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.

**Table 9. The effect of number of daughters according to the gender employment gap on care delivery**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
	All				
Number of daughters	-0.587 (0.820)	0.005 (0.008)	0.004 (0.010)	-0.006 (0.006)	-0.004 (0.005)
Number of daughters x gender employment gap	22.212*** (6.274)	-0.157** (0.060)	-0.156** (0.068)	-0.034 (0.032)	0.007 (0.029)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.169	0.229	0.215	0.226	0.115
N	15,634	15,634	15,634	15,634	15,634
	Mothers				
Number of daughters	-1.472 (0.962)	0.010 (0.009)	0.010 (0.011)	-0.010 (0.009)	-0.001 (0.005)
Number of daughters x gender employment gap	26.601*** (6.761)	-0.236*** (0.063)	-0.224*** (0.069)	-0.035 (0.040)	-0.004 (0.031)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.171	0.233	0.218	0.225	0.112
N	12,460	12,460	12,460	12,460	12,460
	Fathers				
Number of daughters	3.281* (1.769)	-0.025 (0.023)	-0.030 (0.027)	0.005 (0.012)	-0.014 (0.010)
Number of daughters x gender employment gap	-1.812 (16.563)	0.248 (0.187)	0.188 (0.264)	-0.004 (0.080)	0.015 (0.085)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.189	0.242	0.232	0.262	0.144
N	3,174	3,174	3,174	3,174	3,174

Note: This table reports the regression estimates of the number of daughters on several forms of adult care, including informal care, formal care, paid domestic care, nursing care, and meals-on-wheels according to the gender employment gap in Europe. Cluster-robust standard errors (at the country level) are reported in parentheses. The gender employment gap is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.

## APPENDIX

**Table A1. The percentage of employed men between 25- and 64-year-old working in the service sector.**

	Wave 1	Wave 2	Wave 5	Wave 6	Wave 7	Wave 8
Austria	58.6%	56.7%	59.5%	58.8%	59.9%	59.2%
Belgium	63.2%	63.1%	65.7%	66.0%	67.3%	67.5%
Bulgaria						54.2%
Croatia				53.4%		54.1%
Cyprus						67.4%
Czech Republic			47.5%	47.2%	47.2%	48.2%
Denmark	60.8%	62.2%	65.5%	66.6%	67.3%	68.0%
Estonia			50.5%	49.9%		52.8%
Finland						61.2%
France	61.5%	61.4%	64.3%	65.8%	66.1%	65.9%
Germany	54.5%	56.0%	58.3%	58.1%	58.6%	58.9%
Greece		59.4%		66.8%	67.2%	67.8%
Hungary						52.0%
Ireland		55.2%				
Italy	56.7%	56.8%	59.0%	59.1%	59.4%	59.2%
Latvia						53.6%
Lithuania						56.3%
Luxembourg			80.1%	80.2%		83.0%
Malta						72.4%
Netherlands	65.5%	64.9%	70.2%			71.2%
Poland				45.7%	45.4%	45.8%
Portugal				59.2%		
Romania						43.5%
Slovakia						46.8%
Slovenia			50.9%	50.5%		49.3%
Spain	52.8%	53.5%	64.5%	64.7%	64.2%	64.1%
Sweden	62.1%	63.5%	66.9%	67.7%	68.7%	68.5%
Switzerland			65.4%	66.7%	67.3%	68.0%

Note: This table reports the share of workers who work in the service sector among men aged 25-64 by country and sample wave. Source: Eurostat.

**Table A2. The relationship between the gender employment gap and the percentage of men working in the service sector (at the country-wave level).**

Dependent variable:	Gender employment gap	Gender employment gap
Percentage of men working in the service sector	-0.124 (0.079)	-0.407*** (0.111)
Eastern European country		-0.072*** (0.021)
Intercept	0.199*** (0.048)	0.387*** (0.071)
R <sup>2</sup>	0.028	0.145
N	89	89

Note: This table reports the coefficient estimates of the percentage of men working in service sector and gender employment gaps alongside controls for being a Eastern European country. Standard errors are in parentheses. \*p < .1. \*\*p < .05. \*\*\*p < .01.

**Table A3. The effect of having daughters on different forms of care (informal care, formal care, paid domestic care nursing care and meals-on-wheels) according to the gender employment gap in Europe. All individuals living with a partner/spouse or not.**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
All					
Proportion of daughters	-0.088 (1.174)	0.010 (0.010)	0.008 (0.011)	0.003 (0.008)	-0.003 (0.006)
Proportion of daughters x gender employment gap	27.652*** (6.938)	-0.125 (0.075)	-0.087 (0.071)	-0.059 (0.048)	-0.008 (0.054)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.137	0.211	0.182	0.215	0.094
N	45,009	45,009	45,009	45,009	45,009
Mothers					
Proportion of daughters	-0.919 (1.366)	0.014 (0.010)	0.014 (0.011)	-0.002 (0.011)	-0.002 (0.005)
Proportion of daughters x gender employment gap	40.198*** (7.459)	-0.218*** (0.076)	-0.171** (0.075)	-0.075 (0.062)	-0.007 (0.050)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.148	0.218	0.194	0.220	0.105
N	26,466	26,466	26,466	26,466	26,466
Fathers					
Proportion of daughters	0.904 (1.146)	0.005 (0.015)	-0.001 (0.018)	0.013 (0.010)	-0.005 (0.010)
Proportion of daughters x gender employment gap	10.532 (8.267)	0.001 (0.103)	0.035 (0.116)	-0.055 (0.062)	-0.005 (0.068)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.116	0.199	0.153	0.215	0.085
N	18,543	18,543	18,543	18,543	18,543

Note: This table reports the regression estimates of the proportion of daughters on several forms of adult care, including informal care, formal care, paid domestic care, nursing care, and meals-on-wheels according to the gender employment gap in Europe. Cluster-robust standard errors (at the country level) are reported in parentheses. The gender employment gap is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.

**Table A4. The effect of having daughters on informal care, paid domestic care and nursing care according to the gender employment gap in Europe using the sample that includes parents living with their children.**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
All					
Proportion of daughters	-3.909** (1.640)	0.015 (0.018)	0.017 (0.020)	0.000 (0.012)	-0.006 (0.007)
Proportion of daughters x gender employment gap	57.264*** (11.631)	-0.340** (0.123)	-0.334** (0.136)	-0.111 (0.069)	-0.030 (0.062)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.166	0.218	0.202	0.213	0.105
N	18,402	18,402	18,402	18,402	18,402
Mothers					
Proportion of daughters	-5.879*** (1.964)	0.020 (0.017)	0.028 (0.021)	-0.001 (0.014)	-0.000 (0.005)
Proportion of daughters x gender employment gap	66.397*** (13.055)	-0.421*** (0.124)	-0.439*** (0.151)	-0.120 (0.073)	-0.049 (0.051)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.162	0.222	0.204	0.211	0.104
N	14,808	14,808	14,808	14,808	14,808
Fathers					
Proportion of daughters	4.870 (3.681)	-0.024 (0.051)	-0.053 (0.053)	0.001 (0.030)	-0.036 (0.022)
Proportion of daughters x gender employment gap	10.026 (37.599)	0.155 (0.401)	0.283 (0.433)	-0.008 (0.182)	0.088 (0.174)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.195	0.224	0.216	0.248	0.123
N	3,594	3,594	3,594	3,594	3,594

Note: This table reports the regression estimates of the proportion of daughters on several forms of adult care, including informal care, formal care, paid domestic care, nursing care, and meals-on-wheels according to the gender employment gap in Europe. Cluster-robust standard errors (at the country level) are reported in parentheses. The gender employment gap is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.

**Table A5. The effect of having daughters on informal care, paid domestic care and nursing care according to the gender employment gap (from SHARE) in Europe.**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
All					
Proportion of daughters	-0.975 (1.041)	0.014 (0.017)	0.009 (0.017)	0.001 (0.011)	-0.011 (0.009)
Proportion of daughters x gender employment gap	53.664*** (10.134)	-0.368** (0.139)	-0.316** (0.136)	-0.121 (0.078)	0.051 (0.060)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.167	0.231	0.215	0.225	0.115
N	14,467	14,467	14,467	14,467	14,467
Mothers					
Proportion of daughters	-3.102** (1.217)	0.028 (0.019)	0.024 (0.020)	0.003 (0.015)	0.001 (0.007)
Proportion of daughters x gender employment gap	68.723*** (7.104)	-0.569*** (0.162)	-0.498*** (0.162)	-0.177** (0.084)	-0.015 (0.056)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.168	0.234	0.217	0.223	0.114
N	11,544	11,544	11,544	11,544	11,544
Fathers					
Proportion of daughters	8.032*** (2.739)	-0.058 (0.044)	-0.078 (0.054)	-0.011 (0.031)	-0.053** (0.022)
Proportion of daughters x gender employment gap	-16.876 (35.591)	0.653 (0.446)	0.688 (0.578)	0.153 (0.221)	0.282* (0.147)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.189	0.246	0.238	0.263	0.141
N	2,923	2,923	2,923	2,923	2,923

Note: This table reports the regression estimates of the proportion of daughters on several forms of adult care, including informal care, formal care, paid domestic care, nursing care, and meals-on-wheels according to the gender employment gap in Europe (measured by the data from SHARE). Cluster-robust standard errors (at the country level) are reported in parentheses. The gender employment gap is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.

**Table A6. The effect of having daughters care types according to the gender employment gap in Europe (2SLS)**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
	All				
Proportion of daughters	-0.071 (2.164)	0.037 (0.040)	0.031 (0.034)	0.012 (0.018)	0.010 (0.008)
Proportion of daughters x gender employment gap	42.363*** (16.153)	-0.511 (0.333)	-0.504* (0.269)	-0.199 (0.131)	-0.073 (0.058)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
Exogeneity test (p-value)	0.527	0.715	0.685	0.375	0.129
N	15,634	15,634	15,634	15,634	15,634
	Mothers				
Proportion of daughters	-1.848 (2.309)	0.040 (0.045)	0.037 (0.040)	0.011 (0.020)	0.015* (0.008)
Proportion of daughters x gender employment gap	58.082*** (17.944)	-0.589 (0.421)	-0.590 (0.379)	-0.198 (0.146)	-0.055 (0.058)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
Exogeneity test (p-value)	0.349	0.777	0.891	0.422	0.092
N	12,460	12,460	12,460	12,460	12,460
	Fathers				
Proportion of daughters	6.961* (4.203)	-0.011 (0.074)	-0.033 (0.076)	0.012 (0.038)	-0.021 (0.025)
Proportion of daughters x gender employment gap	-26.985 (42.996)	0.104 (0.627)	0.183 (0.708)	-0.135 (0.323)	-0.081 (0.163)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
Exogeneity test (p-value)	0.132	0.043	0.070	0.307	0.669
N	3,174	3,174	3,174	3,174	3,174

Note: this table reports the instrumental variable estimates of proportion of daughter's effect on types of care depending on employment gaps using the gender of the first child as an instrument for the proportion of daughters and the gender of the oldest child interacted with the gender employment gap is used as an instrument for the proportion of daughters interacted with the gender employment gap. Cluster-robust standard errors (at the country level) are reported in parentheses. The gender employment gap is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.

**Table A7. The effect of both having daughters and sons and employment rate by gender on different types of care**

Dependent variable:	Informal care (hours)	Any type of formal care	Paid domestic care	Nursing care	Meal-on-the-wheels
	All				
Number of daughters	14.330*** (4.361)	-0.088*** (0.024)	-0.099*** (0.027)	-0.026 (0.016)	-0.004 (0.021)
Number of daughters x Employment rate of daughters	-14.547** (6.216)	0.111*** (0.037)	0.121*** (0.041)	0.029 (0.024)	0.001 (0.028)
Number of sons	1.321 (7.493)	-0.036 (0.063)	-0.013 (0.052)	0.044 (0.057)	-0.027 (0.040)
Number of sons x Employment rate of sons	1.301 (9.324)	0.046 (0.081)	0.014 (0.066)	-0.050 (0.071)	0.034 (0.049)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.169	0.229	0.215	0.227	0.115
N	15,634	15,634	15,634	15,634	15,634
	Mother's				
Number of daughters	16.227*** (3.498)	-0.136*** (0.027)	-0.135*** (0.031)	-0.036* (0.021)	-0.003 (0.019)
Number of daughters x Employment rate of daughters	-17.701*** (5.124)	0.178*** (0.042)	0.175*** (0.046)	0.040 (0.031)	0.002 (0.027)
Number of sons	5.933 (9.313)	-0.042 (0.065)	-0.043 (0.050)	0.034 (0.067)	-0.017 (0.036)
Number of sons x Employment rate of sons	-4.310 (11.416)	0.056 (0.082)	0.054 (0.062)	-0.036 (0.083)	0.022 (0.044)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.171	0.233	0.218	0.225	0.112
N	12,460	12,460	12,460	12,460	12,460
	Father's				
Number of daughters	4.447 (10.852)	0.131 (0.083)	0.057 (0.139)	0.030 (0.047)	-0.033 (0.050)
Number of daughters x Employment rate of daughters	0.620 (15.393)	-0.193 (0.123)	-0.105 (0.197)	-0.033 (0.068)	0.036 (0.069)
Number of sons	-19.118 (17.257)	-0.028 (0.155)	0.080 (0.105)	0.080 (0.094)	-0.073 (0.100)
Number of sons x Employment rate of sons	25.958 (21.933)	0.027 (0.203)	-0.108 (0.138)	-0.096 (0.118)	0.095 (0.124)
Control variables	Yes	Yes	Yes	Yes	Yes
Country x wave fixed effects	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.190	0.242	0.232	0.262	0.145
N	3,174	3,174	3,174	3,174	3,174

*Note.* This table reports the estimates of number of both daughters and son's effect on types of care depending on employment gaps considering employment gaps. Cluster-robust standard errors (at the country level) are reported in parentheses. The gender employment gap is measured at the country-wave level. \*p < .1. \*\*p < .05. \*\*\*p < .01.