European Network of Economic Policy
Research Institutes

INFORMAL ELDERLY CARE AND FEMALE LABOUR FORCE PARTICIPATION ACROSS EUROPE

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ENEPRI RESEARCH REPORT NO. 13

JULY 2005

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ISBN 92-9079-581-6

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Abstract

This paper uses the European Community Household Panel (ECHP) to analyse the relationship between the dynamics of labour force participation and informal care to the elderly for a sample of women aged 20-59 across 13 European countries. The analysis has two focal points: the relative contributions of state dependence as well as observed and unobserved heterogeneity in explaining the dynamics in women's labour force participation and the existence and consequences of non-random attrition from the ECHP.

The results indicate positive state dependence in labour force participation in all 13 EU countries used in the analysis. The share of unobserved heterogeneity accounts for between 45% and 86% of the total variation in labour force participation. Informal care-giving is found to have a significant, negative impact on the probability of employment only in Germany. Nevertheless, analysis of different sub-groups indicates that the impact is largest for middle-aged women and also for single women in several EU countries.

Keywords: informal elderly care, female labour force participation, dynamic binary response models, ECHP, attrition bias

JEL Codes: J14, J2

* Tarja K. Viitanen is with CPB, The Hague. The author would like to thank Arnaud Chevalier, Kenneth Troske, Alexandru Voicu, Katharina Wrohlich and participants of the IZA workshop on "Women and the Labour Market in Europe" for comments on earlier drafts of the paper as well as Pierre-Carl Michaud and Victor Steiner for initial discussions. All remaining errors are the author's.

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1. Introduction

EU countries are faced with the challenges of an ageing population (Eurostat, 2000). Increasing participation in the labour market to maintain a sustainable dependency ratio lies at the heart of the European employment strategy. In particular, the Lisbon agenda has set an ambitious target for raising women's employment rates to 60% across the EU. Yet many EU countries have women's labour force participation (LFP) rates well below this target (see Table 3 in the main body of the report).[1] Furthermore, the progress towards the target rate has been faltering in recent years (European Council, 2004).

Women are still responsible for the majority of informal care-giving within the household.[2] Whereas the literature on the impact of childcare responsibilities on labour force participation is large, elderly care has received less attention. Nevertheless, informal elderly care is already a common phenomenon across EU countries (see Figure 1). Furthermore, improvements in the lifespan of the elderly mean that more resources need to be targeted at the elderly to help them, for example, to deal with everyday ADL or IADL restrictions.[3] A recent trend in EU countries however is to re-direct transfers from the public provision of elderly care to informal care (Jenson & Jacobzone, 2000). The financial costs of this can be substantial, especially if the caregivers are forced to interrupt their careers or retire early in order to facilitate the provision of informal elder-care at home.[4]

The increasing reliance on informal care-giving is in conflict with the European Commission target to increase women's labour force participation rates. Figure 1 shows that the incidence of informal caring increases dramatically from age 40 onwards reaching 12% across the EU. At the same time, women's labour force participation rates decrease considerably (see Figure 1 for overall EU levels or Table 3 for country specific rates). This paper examines whether informal caring constrains women in their labour market participation. Caring responsibilities may lead to the old-age poverty of carers if they reduce their employment as a consequence of caring, for example, owing to lower collected pension entitlements. Caring may also increase income inequality if disproportionate numbers of lower-income households provide informal care to their elderly relatives.

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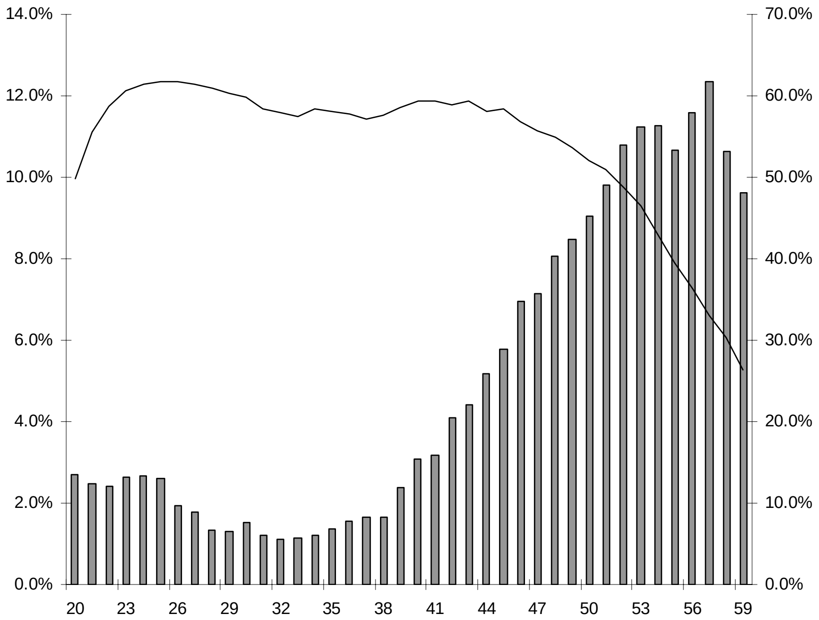
[1] For background information on the trends and determinants of women's labour supply in OECD countries, see Jaumotte (2003) or European Commission (2004).

[2] Possible motivation for informal care includes, for example, altruism or a bequest motive (Bernheim et al., 1985).

[3] ADLs are activities of daily living, which include tasks such as eating, bathing and dressing. IADLs are instrumental activities of daily living, which include tasks such as shopping, meal preparation, using the telephone and medication management.

[4] Women earn less, take more time off the labour force because of children and other care-giving and hence accrue a lower pension entitlement. They also outlive men on average as well as earn less than men. Further, the rising divorce rates may be a concern.

Figure 1. Informal elderly care and LFP by age



Notes: Incidence rates across the following countries: Austria, Belgium, Germany, Denmark, France, Finland, Greece, Ireland, Italy, the Netherlands, Portugal, Spain and the UK. The line represents for labour force participation and the bars are informal elderly care.

This paper examines the impact of caring on the employment dynamics of women aged 20-59 across the EU. Estimates are provided for the potential negative employment effects of care responsibilities,[5] but also for the degree of state dependence in women's labour force participation across the 13 EU countries. Compared with the previous EU-wide study on informal care-giving and women's labour force participation by Spiess & Schneider (2002, 2003), this study provides comprehensive country-specific estimates using both a static and a dynamic framework of analysis, including a thorough analysis of the impact of informal elderly care on labour force participation by age cohort and marital status.

Previous literature on the allocation of time between the provision of informal care to the elderly and labour market work is sparse and mostly analysed in the US context. The earliest studies by Wolf & Soldo (1994) and Stern (1995) provide no evidence that parental care reduces the propensity to be employed or to reduce the conditional hours of work. This result is not confirmed in most other studies. Caring for parents living outside the household and intergenerational co-residence is more commonly found to have a large negative impact on the labour supply of both men and women (Ettner, 1996; Johnson & Lo Sasso, 2000).

Furthermore, Johnson & Lo Sasso (2000) conclude that formal care purchased in the marketplace is not an attractive substitute for informal care. Similarly, intergenerational co-residence is found to be an important mode of assistance to elderly persons (in the US) and that public care might substitute rather than complement family care at no direct cost to the

[5] Obviously the employment effect of caring can be positive if the income effect dominates the substitution effect; however, previous studies have exclusively found a null or negative impact of care-giving on employment.

government (Pezzin et al., 1996; Pezzin & Schone, 1999). The likelihood for intergenerational co-residence increases with parental housing wealth but decreases with the care-giving burden (Hoerger et al., 1996).

UK evidence on the impact of informal care on labour force participation includes studies by Carmichael & Charles (2003) and Heitmueller (2004). The former UK study finds that high-intensity carers are somewhat less likely to work. Heitmueller (2004) finds a significant impact of caring on labour force participation only on co-residential carers, hence confirming that the choice of intergenerational co-residence is an important mode of assistance to elderly persons in the UK. Spiess & Schneider (2002, 2003) use two years of the European Community Household Panel (ECHP) for 12 countries and find a significant negative association between starting and increasing informal care-giving and the change in weekly work hours. They find that the impact varies across countries with northern European women responding to starting care responsibilities and southern European women responding to increasing them. Nevertheless, their analysis does not allow for country-specific effects or for individual unobserved heterogeneity and state dependence. In addition, their pooling of countries into northern and southern European countries does not allow us to draw policy conclusions for any country separately. Overall, the previous analyses using the ECHP to examine this topic do not fully exploit the panel nature of the data and rely on strict assumptions regarding the unobservables both at the individual and at the country level.

This paper is organised as follows. Section 2 outlines the econometric method used in the analysis. Section 3 presents the data with a description of its main features. Section 4 presents and discusses the results of the estimation and section 5 concludes.

2. Econometric method

This paper estimates the impact of informal caring on women's labour force participation using both static and dynamic panel data estimation. Only the extensive (participation) margin is examined owing to the previously quoted EU targets of 60% for women's labour force participation. Furthermore, Heckman (1993) notes that the labour supply response of women is strongest at the participation margin.

The dynamic structure of modelling labour force participation allows us to distinguish between the unobserved individual effect and past participation by the inclusion of a lagged dependent variable in the model. The importance of distinguishing between the unobserved heterogeneity and true state dependence is directly relevant to the EU employment targets. For example, if there is no state dependence in women's labour force participation then informal caring responsibilities would potentially have a large negative impact on the employment probabilities.

Heckman (1981) separates serial persistence in labour force participation decisions into true state dependence and spurious state dependence. True state dependence results from the changed propensity to participate in the labour market as a result of past participation. Spurious state dependence is the result of persistent individual heterogeneity that causes participation propensities to differ irrespective of past participation. Hence neglecting heterogeneity in dynamic models overstates the effect of past participation on current participation.

The reasons quoted for the positive state dependence in labour force participation include, for example, human capital and job-matching models as well as intertemporally non-separable preferences for leisure (Hotz et al., 1988) or high fixed costs (for example, search costs) of entering the labour market (Eckstein & Wolpin, 1990).

To distinguish between true state dependence and unobserved heterogeneity, dynamic random effects probit models and a pooled estimator for 13 EU countries are estimated (see, for example, Wooldridge, 2002). The probit model, where *yit* indicates a dichotomous variable taking value one for those who are observed working at time *t* and *yit-1* indicating its lagged value, can be formalised as follows:

$$y_{it} = 1(\theta_1 y_{it-1} + \theta_2 z_{it} + c_i + e_{it} > 0) \quad (1)$$

where 1(.) is an indicator function that equals unity if the condition in the parentheses is true and zero otherwise, *zit* is a vector of exogenous variables, including a dichotomous variable for elderly care, and *ci* and eit are unobservables. The individual-specific term *ci* accounts for the time-invariant, unobservable determinants of labour force participation for a given individual reflecting, for example, the latent propensity to work or motivation. The residuals *eit* are assumed N(0,1).

Given the presence of individual-specific effects *ci* in a dynamic binary choice model, one cannot validly assume that the initial observation on labour force participation, *y0*, is truly exogenous since the start of the stochastic process is not observed. This is known as the initial conditions problem (Heckman, 1981); in other words, those who are observed working at *t0* may not be a random sample. Initial conditions in this paper are specified as suggested by Wooldridge (2000, 2005).[6]

$$c_i = \alpha_0 + \alpha_1 y_{i0} + \alpha_2 \bar{z}_i + a_i \quad (2)$$

The Wooldridge solution to the initial conditions problem conditions the distribution of the unobserved effect on the initial value of the dependent variable and any exogenous explanatory variables. The inclusion of the means of the time-varying regressors z_i allows the observed regressors to be correlated with the individual effect (Mundlak, 1978, Chamberlain, 1984). The α_i are assumed to be normally distributed with mean zero and variance σ_a^2. Furthermore, e_{it} are assumed to be independent of c_i. In other words, their intertemporal correlation is constant across time given by $\rho = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_e^2}$. Using these assumptions, the individual effect can be integrated out and approximated by Gauss-Hermite quadrature for the random effects probit model (Butler & Moffitt, 1982).

A further crucial assumption of the random effects probit is the following:

$$P(y_{it} = 1 \mid y_{it-1}, \ldots, y_{i0}, z_i, c_i) = P(y_{it} = 1 \mid y_{it-1}, z_{it}, c_i) \quad (3)$$

In other words, z_{it} are assumed strictly exogenous once they are conditioned on the initial conditions. This assumption can be examined by testing whether there are any feedback effects from the future values of the explanatory variables to the current value of the dependent variable. In the presence of feedback effects, the random effects probit estimates are biased.

In the presence of feedback effects the pooled estimator provides consistent but inefficient estimates (Wooldridge, 2002). A slight disadvantage of pooled estimation is that the share of unobserved heterogeneity in the error variance (ρ) cannot be determined. In the pooled model the variance of the total error term is normalised to one (whereas in the random effects probit the overall error variance equals σ_a^2+1 following from earlier assumptions) and hence the coefficient estimates in the pooled model converge to $\theta/(\sigma_a^2+1)^{1/2}$, the so-called 'population-

[6] Another common method of modelling the initial conditions is specified by Heckman (1981). This method ideally uses pre-survey information alongside the first period characteristics in the initial period equation to predict the initial condition.

averaged parameters'. The pooled estimator is also robust to serial correlation in e_{it}. In principle it would be possible to allow for serial correlation in the idiosyncratic error term using maximum simulated likelihood estimation (see for example Train, 2003 for a general introduction or Hyslop, 1999 for women's labour force participation). Contoyannis et al. (2004b) however note that a specification that allows for heterogeneity, state dependence and serial correlation in e_{it} is difficult because of the problems of separately identifying state dependence and serial correlation.

3. The ECHP data

3.1 Sample and variables

This paper uses eight waves (1994-2001) of the ECHP. The ECHP is a large-scale comparative panel study across the EU-15. The ECHP was designed to develop comparable social indicators across the EU and covers a wide variety of range of topics such as labour market activity, education, income, health and demographic characteristics at the individual level. The panel nature of the data allows us to control not only for observable individual characteristics but also for the changes in individual and household circumstances and unobservable individual effects.

In the first wave of interviews in 1994, data were collected for 12 EU member states: Belgium, Denmark, the UK, Germany, the Netherlands, Luxembourg, France, Ireland, Italy, Greece, Spain and Portugal. Austria entered in 1995, Finland in 1996 and Sweden in 1997. The choice of the countries is guided by the availability of data for each country. We drop the data from Luxembourg due to a small sample size and Sweden because information on care-giving is missing. Furthermore, Germany and the UK do not have ECHP data for waves 4-8, so the national panels – Germany's SOEP and the UK's BHPS – are used instead. For the German SOEP sample, care-giving is nearly an absorbing state (0.39 leaving non-CARE). Instead, we use the German ECHP for waves 1-3. For the UK, we use BHPS sample for waves 1-8.

The subsequent analysis uses a sub-sample chosen according to the individual characteristics at the first date of interview. We restrict the sample to include women[7] aged between 20 and 59 years inclusively, who are not in education or training and are not reported to be in early retirement[8] (see Table 1 for the number of remaining observations due to sample selection). Individuals remain in the sample at subsequent interviews until they exit the survey or have missing information on the variables of interest. Hence we use an unbalanced panel in which individuals are allowed to leave the sample. This selection allows us to 1) identify the lagged employment status and employment status at the first date of interview to control for initial conditions and 2) provide attrition-bias corrected estimates.

[7] Women are more likely than men to provide informal care to the elderly (Wolf & Soldo, 1994).

[8] Retirement is mostly an absorbing state in Europe.

Table 1. Data selection (all countries)

	Observations after selection
ECHP Period 1994-2001[(a)]	909,423
Reason for removal	
Out of age bracket (20-59)	630,288
Male	321,911
In education, training or early retirement	265,074
Missing values on education, marital status or health	259,092
Time gaps	242,415
Not observed at first wave	197,044

(a) Sample of countries: Austria, Belgium, Germany, Denmark, France, Finland, Greece, Ireland, Italy, the Netherlands, Portugal, Spain and the United Kingdom.

Source: Author calculations based on the ECHP.

Table 2 defines the variables used in the empirical analysis of labour force participation dynamics and informal elderly care. Labour force participation (LFP) takes value 1 if the interviewee reports participating in paid employment. The CARE variable has been defined as taking the value 1 for interviewees who report looking after (without pay) a person who needs help because of old age, disability or illness other than a child.

Table 2. Variable definitions

Variable	Definition
LFP	1 if in paid employment, 0 otherwise
CARE	1 if caring for an elderly or disabled adult
MARS1	1 if married, 0 otherwise
MARS2	1 if separated or divorced, 0 otherwise
MARS3	1 if widowed, 0 otherwise
MARS4	1 if never married, 0 otherwise
HIQ1	1 if highest schooling level is 3rd level or above, 0 otherwise
HIQ2	1 if highest schooling level is 2nd stage of secondary level, 0 otherwise
HIQ3	1 if highest schooling level is less than 2nd stage of secondary level
KIDS_LT13	1 if children aged strictly less than 13 present in household, 0 otherwise
KIDS_GT13	1 if children aged greater than 13 present in household, 0 otherwise
Bad health	1 if self-assessed health is reported poor or very poor, 0 otherwise
HHSIZE	Number of people in household including respondent

Source: Author's data.

3.2 Data description

The research question of interest is to examine the dynamics of employment (hereafter referred to as LFP) and the impact of informal caring upon it (hereafter referred to as CARE). The first column of Table 3 summarises LFP across the countries used in the analysis.

Table 3. Country-specific descriptive statistics on LFP and its persistence

Country	LFP	$Prob(LFP_t=1 \mid LFP_{t-1}=1)$	$Prob(LFP_t=0 \mid LFP_{t-1}=0)$
AU	0.627	0.942	0.879
BE	0.642	0.958	0.934
DE	0.612	0.940	0.867
DK	0.853	0.953	0.712
FR	0.635	0.932	0.865
FI	0.820	0.951	0.696
GR	0.371	0.917	0.940
IR	0.442	0.919	0.914
IT	0.441	0.943	0.950
NL	0.490	0.916	0.908
PT	0.588	0.941	0.897
SP	0.354	0.883	0.918
UK	0.660	0.926	0.854

Notes: Country abbreviations – AU Austria, BE Belgium, DE Germany, DK Denmark, FR France, FI Finland, GR Greece, IR Ireland, IT Italy, NL the Netherlands, PT Portugal, SP Spain and UK United Kingdom.

Source: Author calculations based on the ECHP.

Labour force participation rates vary considerably among the sample of countries. The highest participation rates are observed for Denmark (85.3%) and Finland (82%) while the lowest rates are observed for Greece (37.1%) and Spain (35.4%). Other countries that fall clear of the target of the European employment strategy (60% for women's participation) are Ireland, Italy, the Netherlands and Portugal.

The second and third columns of Table 3 report the conditional probabilities for participation and non-participation, respectively, where LFP_t=1 if the individual is employed at time *t* and zero otherwise.[9] The second column reports the probability of being employed at time *t* conditional on being employed at time *t-1*. All the countries in the sample exhibit a high degree of serial persistence in labour force participation. Obviously this simple analysis does not control for (observed or unobserved) individual heterogeneity.

The regression analysis in the following section separates this observed serial persistence in LFP into true state dependence (i.e. the propensity to participate is changed because of past participation) and spurious state dependence (i.e. persistent individual heterogeneity causes participation propensities to differ irrespective of past participation).

The third column Table 3 reports the probability of not being employed at *t* conditional on not being employed at time *t-1*. The lowest level of serial persistence in non-employment is observed for Denmark (71.2%) and Finland (69.6%). A very high level of serial persistence in non-participation may indicate countries where women permanently specialise in household production. The highest levels in persistence in non-participation in this sample of countries are observed in Belgium, Greece and Italy.

[9] A disadvantage of this method of analysis is that the time interval between the observed states is a year and hence spells in LFP or CARE that last less than a year are not captured in the survey interviews and hence cannot be captured in this analysis. Nevertheless, this analysis can be interpreted as looking at the persistence in LFP and CARE status in the medium- rather than short-term transitions.

The ECHP also includes detailed information on the household and personal characteristics that are likely determinants of the LFP decision. Controls that are included in the analysis include: age groups (20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54 and 55-59), dummies for the presence of pre-teen and teenage children,[10] a dichotomous variable for a second or a higher level of education and for very bad/bad health, an indicator of marital status (married, separated/divorced, widowed, never married) and household size as well as year and regional dummies.[11] Table 2 provides country-specific descriptive statistics on these control variables. Table 4 summarises the variables used in this study separately for each country. The proportion of women providing informal care to an elderly person varies between 3% in France to 12.5% in the UK. The very high UK figure is similar to that reported in Heitmueller (2004), which reports a figure of 15% for informal care-giving in the UK. Between 67% and 81% of the women in the sample are married, while a fairly constant 1-2% are widowed. The divorce/separation rates vary considerably between the southern countries (Greece, Italy, Portugal and Spain) and Ireland with relatively low rates of between 3-5% and the other countries in the sample where divorce/separation rates are in excess of 8%. The level of highest qualification also varies considerably between countries; however, since these measurements depend crucially on the national educational system, they may not be comparable across countries (but are consistent within countries).

Attrition is considerable in the ECHP (see country-specific attrition in Table 5).[12] Table 5 also reports the mean values of CARE and LFP measured at the first and the last observed waves. Whereas the proportion of caregivers does not change between the first- and last-wave interviewees, the LFP rates change considerably for most countries. Obviously the higher participation rates may be the result of improved macroeconomic circumstances; however, it may also be related to non-random attrition.

To test whether attrition biases the empirical estimates, we use a test proposed by Verbeek & Nijman (1992). The test involves including the following variables in the dynamic model for an unbalanced panel: 1) the number of waves in which the individual participates (number of waves); 2) a binary indicator for participation in all waves (all waves) and; 3) a binary indicator for not responding in the following wave (next wave). These indicator variables should not enter the model significantly under the hypothesis of no selectivity bias.

Table 6 reports this Verbeek & Nijman test for attrition and shows that attrition may bias the estimates for some of the countries in the sample. Specifically, for Austria all of the attrition bias indicators are significant, for Ireland and the UK the individuals who respond in all the waves are more likely to participate in the labour force. For Portugal, the number of waves is a significant predictor of work participation while the most common potential source of attrition bias is dropping out of the survey. The indicator for dropping out, the variable called ‘next wave’, is significant in Austria, Belgium, Denmark, Finland, Portugal and the UK. In all cases, those who drop out at time *t+1* are less likely to participate in the labour force at time *t* as expected.

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[10] The fertility variables (KIDS_LT13 and KIDS_GT13) are assumed to be exogenous in the analysis. This assumption for dynamic models is supported by Hyslop (1999), who concludes that “after controlling for serially correlated errors or state dependence, there is no evidence that fertility decisions are correlated with unobserved tastes for work” (p. 1278).

[11] The regional indicators are not available for the Netherlands or the German ECHP sample.

[12] Attrition rate is defined as the ratio of the number of dropouts between waves *t* and *t-1* to the number of observations at *t-1*.

Table 4. Country-specific descriptive statistics

	AU	BE	DE	DK	FR	FI	GR	IR	IT	NL	PT	SP	UK
LFP	0.627	0.642	0.612	0.853	0.635	0.820	0.371	0.442	0.441	0.490	0.588	0.354	0.660
	(0.484)	(0.479)	(0.487)	(0.354)	(0.481)	(0.384)	(0.483)	(0.497)	(0.497)	(0.500)	(0.492)	(0.478)	(0.474)
CARE	0.037	0.043	0.049	0.040	0.030	0.050	0.032	0.035	0.041	0.030	0.042	0.064	0.125
	(0.190)	(0.203)	(0.216)	(0.197)	(0.170)	(0.217)	(0.175)	(0.183)	(0.198)	(0.171)	(0.200)	(0.245)	(0.331)
AGE	39.966	40.575	40.634	41.674	40.800	42.274	39.809	40.468	40.500	41.069	41.018	40.970	40.117
	(9.896)	(9.171)	(10.244)	(9.557)	(9.556)	(9.286)	(10.215)	(10.417)	(9.902)	(9.159)	(9.968)	(10.103)	(9.853)
MARS1	0.728	0.738	0.763	0.665	0.685	0.716	0.814	0.747	0.785	0.768	0.784	0.781	0.680
	(0.445)	(0.440)	(0.425)	(0.472)	(0.465)	(0.451)	(0.389)	(0.435)	(0.411)	(0.422)	(0.411)	(0.413)	(0.466)
MARS2	0.077	0.123	0.086	0.117	0.089	0.104	0.035	0.044	0.027	0.081	0.049	0.044	0.143
	(0.266)	(0.328)	(0.280)	(0.321)	(0.284)	(0.306)	(0.185)	(0.204)	(0.162)	(0.273)	(0.217)	(0.205)	(0.350)
MARS3	0.011	0.010	0.015	0.019	0.027	0.018	0.015	0.006	0.010	0.004	0.027	0.010	0.011
	(0.104)	(0.098)	(0.120)	(0.137)	(0.161)	(0.134)	(0.120)	(0.078)	(0.101)	(0.062)	(0.163)	(0.101)	(0.105)
MARS4	0.185	0.129	0.137	0.199	0.200	0.162	0.136	0.204	0.178	0.147	0.139	0.164	0.166
	(0.388)	(0.335)	(0.343)	(0.399)	(0.400)	(0.368)	(0.343)	(0.403)	(0.382)	(0.355)	(0.346)	(0.371)	(0.372)
HIQ1	0.086	0.370	0.132	0.375	0.242	0.437	0.212	0.146	0.069	0.115	0.065	0.185	0.351
	(0.280)	(0.483)	(0.339)	(0.484)	(0.428)	(0.496)	(0.409)	(0.353)	(0.254)	(0.319)	(0.246)	(0.388)	(0.477)
HIQ2	0.636	0.328	0.569	0.421	0.314	0.363	0.300	0.400	0.371	0.375	0.102	0.157	0.138
	(0.481)	(0.470)	(0.495)	(0.494)	(0.464)	(0.481)	(0.458)	(0.490)	(0.483)	(0.484)	(0.302)	(0.363)	(0.345)
HIQ3	0.278	0.302	0.299	0.204	0.444	0.200	0.488	0.454	0.560	0.510	0.834	0.658	0.511
	(0.448)	(0.459)	(0.458)	(0.403)	(0.497)	(0.400)	(0.500)	(0.498)	(0.496)	(0.500)	(0.372)	(0.474)	(0.500)
KIDS_LT12	0.404	0.299	0.236	0.317	0.351	0.398	0.299	0.360	0.295	0.325	0.321	0.307	0.328
	(0.491)	(0.458)	(0.424)	(0.465)	(0.477)	(0.490)	(0.458)	(0.480)	(0.456)	(0.468)	(0.467)	(0.461)	(0.470)
KIDS_GT13	0.090	0.074	0.053	0.072	0.093	0.103	0.093	0.099	0.096	0.105	0.095	0.097	0.078
	(0.286)	(0.261)	(0.224)	(0.259)	(0.290)	(0.304)	(0.290)	(0.298)	(0.294)	(0.306)	(0.293)	(0.296)	(0.268)
Bad health	0.027	0.039	0.045	0.027	0.061	0.029	0.031	0.020	0.056	0.044	0.129	0.075	0.097
	(0.161)	(0.194)	(0.206)	(0.161)	(0.240)	(0.169)	(0.174)	(0.138)	(0.230)	(0.206)	(0.335)	(0.264)	(0.296)
HHSIZE	3.536	3.312	3.066	3.004	3.305	3.185	3.657	4.379	3.707	3.157	3.884	3.884	3.144
	(1.464)	(1.282)	(1.242)	(1.244)	(1.383)	(1.369)	(1.173)	(1.768)	(1.209)	(1.276)	(1.507)	(1.354)	(1.248)
N	9,451	10,040	8,087	8,167	23,354	8,522	14,968	13,210	26,856	17,490	15,091	23,581	18,227

Source: Author calculations based on the ECHP.

Table 5. Sample sizes and attrition rates by wave and country

Country	1994	1995	1996	1997	1998	1999	2000	2001	$\overline{\text{CARE}}$ (a)	$\overline{\text{CARE}}$ (b)	$\overline{\text{LFP}}$ (a)	$\overline{\text{LFP}}$ (b)
AU	N/A	2050	1707	1472	1277	1123	959	863	0.039	0.039	0.588	0.655
			[16.7%]	[13.8%]	[13.2%]	[12.1%]	[14.6%]	[10.0%]	(0.194)	(0.195)	(0.492)	(0.476)
BE	1891	1635	1452	1277	1124	987	885	789	0.044	0.044	0.621	0.686
		[13.5%]	[11.2%]	[12.1%]	[12.0%]	[12.2%]	[10.3%]	[10.8%]	(0.205)	(0.206)	(0.485)	(0.465)
DE	3033	2656	2398	N/A	N/A	N/A	N/A	N/A	0.042	0.051	0.595	0.638
		[12.4%]	[9.7%]						(0.200)	(0.220)	(0.491)	(0.481)
DK	1771	1482	1185	975	807	720	637	590	0.033	0.047	0.794	0.922
		[16.3%]	[20.0%]	[17.7%]	[17.2%]	[10.8%]	[11.5%]	[7.4%]	(0.180)	(0.213)	(0.405)	(0.268)
FR	4280	3705	3380	2934	2622	2370	2120	1943	0.032	0.025	0.578	0.679
		[13.4%]	[8.8%]	[13.2%]	[10.6%]	[9.6%]	[10.5%]	[8.3%]	(0.175)	(0.155)	(0.494)	(0.467)
FI	N/A	N/A	2190	1837	1482	1277	913	823	0.050	0.056	0.757	0.893
				[16.1%]	[19.3%]	[13.8%]	[28.5%]	[9.9%]	(0.217)	(0.230)	(0.429)	(0.309)
GR	3172	2562	2194	1880	1558	1323	1178	1101	0.033	0.042	0.339	0.422
		[19.2%]	[14.4%]	[14.3%]	[17.1%]	[15.1%]	[11.0%]	[6.5%]	(0.179)	(0.200)	(0.473)	(0.494)
IR	3183	2405	1915	1611	1387	1130	859	720	0.034	0.029	0.418	0.513
		[24.4%]	[20.4%]	[15.9%]	[13.9%]	[18.5%]	[24.0%]	[16.2%]	(0.180)	(0.168)	(0.493)	(0.500)
IT	4868	4339	3948	3450	3029	2707	2406	2109	0.046	0.042	0.425	0.459
		[10.9%]	[9.0%]	[12.6%]	[12.2%]	[10.6%]	[11.1%]	[12.3%]	(0.210)	(0.201)	(0.494)	(0.498)
NL	3122	2789	2556	2288	2022	1809	1552	1352	0.030	0.036	0.469	0.535
		[10.7%]	[8.4%]	[10.5%]	[11.6%]	[10.5%]	[14.2%]	[12.9%]	(0.171	(0.185)	(0.499)	(0.499)
PT	2773	2398	2120	1908	1701	1544	1375	1272	0.036	0.040	0.523	0.637
		[13.5%]	[11.6%]	[10.0%]	[10.8%]	[9.2%]	[10.9%]	[7.5%]	(0.186)	(0.196)	(0.500)	(0.481)
SP	5021	4004	3408	2894	2482	2180	1889	1703	0.067	0.070	0.319	0.416
		[20.3%]	[14.9%]	[15.1%]	[14.2%]	[12.2%]	[13.3%]	[9.8%]	(0.249)	(0.255)	(0.466)	(0.493)
UK	3007	2671	2477	2301	2153	1999	1877	1742	0.121	0.154	0.639	0.689
		[11.2%]	[7.3%]	[7.1%]	[6.4%]	[7.2%]	[6.1%]	[7.2%]	(0.326)	(0.361)	(0.481)	(0.463)

(a) Denotes the mean value in the first observed wave.

(b) Denotes the mean value in the last observed wave.

Notes: AU enters the survey in 1995, FI in 1996. Final year for DE is 1996. Square brackets report the attrition rate. Standard deviation in parenthesis.

Source: Author calculations on the ECHP.

Table 6. The Verbeek & Nijman test for attrition (based on dynamic probit model with a Wooldridge specification for initial conditions and correlated effects)

	AU	BE	DE	DK	FR	FI	GR	IR	IT	NL	PT	SP	UK
All waves	**-0.676**	0.341	0.790	0.180	0.142	0.425	0.144	**0.563**	0.217	-0.070	0.174	-0.148	**0.299**
	(0.210)	(0.234)	(0.650)	(0.193)	(0.113)	(0.219)	(0.207)	**(0.157)**	(0.158)	(0.111)	(0.168)	(0.126)	**(0.123)**
Number of waves	**0.135**	-0.086	-0.402	0.067	-0.006	-0.076	0.019	-0.060	0.002	-0.046	**0.156**	0.040	-0.017
	(0.061)	(0.063)	(0.446)	(0.048)	(0.031)	(0.087)	(0.053)	(0.038)	(0.038)	(0.034)	**(0.046)**	(0.032)	(0.036)
Next wave	**-0.482**	**-0.374**	-0.314	**-0.337**	-0.086	**-0.602**	0.097	-0.137	-0.123	-0.086	**-0.233**	-0.034	**-0.245**
	(0.117)	**(0.136)**	(0.352)	**(0.108)**	(0.072)	**(0.149)**	(0.103)	(0.086)	(0.078)	(0.079)	**(0.093)**	(0.067)	**(0.090)**

Notes: Coefficient estimates with standard errors in parentheses. Statistical significance at 5% level indicated in bold font.

Source: Author calculations based on the ECHP.

Since it is apparent that the estimates for some of the countries may be biased due to non-random attrition, we also provide attrition-corrected estimates. Specifically, we allow for attrition by adopting an inverse probability weighted estimator (IPW) with the pooled probit model (Wooldridge, 2002). This method assumes that attrition can be treated as ignorable non-response, conditional on characteristics observed in the first wave. Specifically, probits are estimated for response vs. non-response at each wave of the panel using the initial sample of individuals observed in the first wave. The inverse of the fitted probabilities from these probits is then used to weight the observations in the pooled probit model. A similar strategy for dealing with potential attrition bias has previously been adopted by for example Contoyannis et al. (2004a).

4. Results

The section reports the estimates of the impact of informal caring on women's labour force participation (LFP) using both static and dynamic specifications. Table 7 reveals the coefficient estimates for the main variables of interest – informal caring and lagged labour force participation. To assess the magnitude of the estimated effects, Table 8 shows average partial effects (APE), averaged over individual heterogeneity (observed and unobserved) as follows:

$$N^{-1}\sum_{i=1}^{N}\Phi(z_t\hat{\theta}_{a2}+\hat{\theta}_{a1}y_{t-1}+\hat{\alpha}_{a0}+\hat{\alpha}_{a1}y_{i0}+\hat{\alpha}_{a2}\bar{z}_i) \tag{4}$$

where subscript α denotes multiplication by (1+σ2)-1/2 in the random effects model only. The empirical specification across all countries also includes controls for individual and household characteristics (see the appendix for complete country-specific results).

State dependence

The first row of Table 7 reports the estimate for the impact of informal caring on LFP in a static set-up controlling for observed heterogeneity. In this framework, caring is found to have a significant, negative impact on LFP in the majority of the countries in the sample (FR, IR, IT, NL, PT, SP and the UK). Yet, a simple pooled, static model such as this does not allow the estimates to reflect the persistence in labour force participation observed in Table 3, resulting from both spurious state dependence (unobserved heterogeneity) and true state dependence. Both of these concerns are addressed in the dynamic models that are presented in rows two and three of Table 7.

First of all, the estimates of the pooled probit (second row of Table 7) show evidence of strong persistence in labour force participation: the coefficient on lagged LFP is positive and highly significant in all of the countries in the sample. The corresponding average partial effects are reported in Table 8 and the magnitude of state dependence is estimated to range between the low of 0.09 in Germany to the high of 0.399 in the UK. In other words, for example in the UK, participating in the labour force at time *t-1* increases the probability of labour force participation at time *t* by 40 percentage points. Comparable estimates for the US find a 37 percentage-point state dependence (Hyslop, 1999). The impact of informal elderly care on the probability of labour force participation is negative or zero as expected in most countries; but these estimates are significant only Germany and Italy with 0.4 and 0.2 percentage-point impacts respectively.

Whereas the pooled estimates are consistent even to the presence of serial correlation in the error term, they are inefficient. The results using a more efficient estimator, the random effects probit, are reported in the third row of Table 7 with the corresponding average partial effects reported in the second row of Table 8.

Table 7. Labour force participation (coefficient estimates)

	AU	BE	DE	DK	FR	FI	GR	IR	IT	NL	PT	SP	UK
Static probit													
CARE	0.083	-0.028	-0.166	-0.085	**-0.228**	-0.131	-0.028	**-0.431**	**-0.305**	**-0.374**	**-0.293**	**-0.146**	**-0.176**
	(0.115)	(0.106)	(0.089)	(0.133)	**(0.082)**	(0.105)	(0.099)	**(0.118)**	**(0.069)**	**(0.108)**	**(0.090)**	**(0.061)**	**(0.053)**
Log likelihood	-5185.8	-5144.6	-4647.8	-2943.8	-13325.1	-3560.9	-8186.0	-7132.2	-14703.8	-10063.8	-8576.4	-12074.6	-10156.8
N	9,451	10,040	8,087	8,167	23,354	8,522	14,968	13,210	26,856	17,490	15,091	23,581	18,227
Pooled probit													
LFP_{T-1}	**1.188**	**2.111**	**0.524**	**1.373**	**1.873**	**1.549**	**2.194**	**1.474**	**1.314**	**2.124**	**1.064**	**1.606**	**2.029**
	(0.049)	**(0.075)**	**(0.045)**	**(0.076)**	**(0.039)**	**(0.075)**	**(0.057)**	**(0.050)**	**(0.035)**	**(0.048)**	**(0.040)**	**(0.039)**	**(0.044)**
CARE	0.019	-0.138	**-0.233**	-0.065	-0.158	-0.180	-0.071	-0.103	**-0.207**	0.001	-0.251	-0.077	-0.106
	(0.129)	(0.151)	**(0.124)**	(0.162)	(0.091)	(0.113)	(0.122)	(0.137)	**(0.081)**	(0.133)	(0.088)	(0.067)	(0.060)
Log likelihood	-4052.3	-1728.5	-2832.2	-1537.4	-5715.6	-1756.7	-2836.8	-3699.4	-8035.9	-3910.0	-5712.4	-5963.4	-4438.5
RE Probit													
LFP_{T-1}	**0.667**	**1.414**	**0.259**	**0.888**	**1.293**	**0.843**	**1.288**	**0.978**	**0.897**	**1.425**	**0.656**	**0.861**	**1.399**
	(0.068)	**(0.089)**	**(0.094)**	**(0.092)**	**(0.044)**	**(0.092)**	**(0.072)**	**(0.060)**	**(0.047)**	**(0.061)**	**(0.052)**	**(0.047)**	**(0.054)**
	[0.275]	**[0.788]**	**[0.097]**	**[0.633]**	**[0.849]**	**[0.520]**	**[0.727]**	**[0.526]**	**[0.335]**	**[1.016]**	**[0.279]**	**[0.521]**	**[1.038]**
CARE	0.157	0.155	**-0.612**	-0.032	-0.163	-0.359	-0.160	-0.204	-0.226	-0.034	-0.179	-0.021	-0.141
	(0.204)	(0.224)	**(0.243)**	(0.210)	(0.131)	(0.227)	(0.194)	(0.185)	(0.129)	(0.162)	(0.140)	(0.104)	(0.083)
	[0.022]	[0.105]	**[-0.229]**	[-0.059]	[-0.123]	[-0.216]	[-0.080]	[-0.090]	[-0.096]	[-0.023]	[-0.076]	[-0.003]	[-0.105]
P	**0.854**	**0.697**	**0.860**	**0.546**	**0.553**	**0.613**	**0.686**	**0.711**	**0.835**	**0.493**	**0.819**	**0.659**	**0.450**
	(0.012)	**(0.028)**	**(0.013)**	**(0.041)**	**(0.020)**	**0.036**	**(0.025)**	**(0.017)**	**(0.007)**	**(0.030)**	**(0.009)**	**(0.016)**	**0.027**
Log likelihood	-2836.3	-1519.6	-2266.2	-1446.9	-5300.6	-1642. 9	-2600.9	-3056.3	-5226.8	-3802.9	-3842.8	-5293.5	-4320.9
Feedback from	No	Yes	No	No	Yes	No	No	No	Yes	No	No	No	Yes
$CARE_{T+1}$ LFP_T		1%			5%				5%				10%
N	8,548	8,231	5,881	6,489	19,194	6,470	11,834	10,402	23,009	14,369	13,125	18,889	15,220

Notes: Standard errors in parentheses. Statistical significance at 5% level indicated in bold font. RE probit coefficients multiplied by $(1+\sigma^2)^{-1/2}$ reported in square brackets. All specifications include controls for: married, separated/divorced, widowed, (omitted: single); age 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 (omitted: 20-24); 3rd level qualification, 2nd level qualification (omitted: less than 2nd level qualification); bad health; household size; presence of children aged 13+; regional dummies (not available for: NL), wave dummies.

Source: Author calculations based on the ECHP.

Table 8. Labour force participation (average partial effects)

	AU	BE	DE	DK	FR	FI	GR	IR	IT	NL	PT	SP	UK
Pooled probit													
LFP_{t-1}	**0.217**	**0.354**	**0.090**	**0.252**	**0.346**	**0.321**	**0.246**	**0.196**	**0.167**	**0.310**	**0.156**	**0.185**	**0.399**
CARE	-0.000	-0.000	**-0.004**	-0.001	-0.001	-0.001	-0.000	-0.001	**-0.002**	0.000	-0.003	-0.001	-0.002
RE Probit													
LFP_{t-1}	**0.050**	**0.100**	**0.013**	**0.091**	**0.130**	**0.076**	**0.070**	**0.064**	**0.041**	**0.129**	**0.042**	**0.055**	**0.178**
CARE	0.001	0.001	**-0.003**	-0.000	-0.001	-0.002	-0.000	-0.001	-0.001	-0.000	-0.001	-0.000	-0.003

Notes: Statistical significance at 5% level indicated in bold font. Statistical significance is based on the underlying coefficient estimate.

Source: Author calculations based on the ECHP.

A comparison of the pooled versus random effects estimates shows, first of all, that allowing for unobserved heterogeneity in the model has a big improvement on its fit for all countries as measured by the log-likelihood value. Second of all, the estimates for state dependence are lower but still highly significant for all the countries in the sample. To compare the coefficient estimates across the two specifications, Table 7 reports also the coefficient estimate multiplied by (1+σ2)-1/2 in square brackets. A comparison of the coefficient estimates indicates that the random effects estimates are always half or less than the magnitude of the pooled probit coefficient estimates. To talk about the magnitudes of the estimated effects, the average partial effect reported in Table 8 shows a clear reduction in the estimate of state dependence compared with the pooled estimates. This is driven by the fact that the relative magnitudes of the effects of lagged LFP relative to LFP0 are reversed in the random effects models compared with the pooled models (see the appendix for country-specific estimates on this). The positive state dependence, however, remains highly significant in all of the countries. The lowest estimate for state dependence is found for Germany (1.3 percentage points) while the highest is estimated for the UK (18 percentage points). Most of the other country estimates for state dependence in labour force participation lie between 5 and 10 percentage points, except for FR and NL with the slightly higher values of 13 percentage points.

The impact of informal elderly care on labour force participation probabilities remains significant only in Germany with an estimate of a negative impact of 0.3 percentage points. Hence a comparison of the random effects estimates with the static probit estimates indicates that, first of all, true state dependency accounts for some of the observed labour supply behaviour. It is of interest also to examine the extent of the unobserved heterogeneity upon it. This can be assessed within the random-effects probit framework.

Unobserved heterogeneity

The estimate of ρ in Table 7 reports the share of unobserved heterogeneity in the error variance. Hyslop (1999) estimates the share of unobserved heterogeneity to account for 49% of the total error variance for the labour force participation of women in the US. The UK estimate reported in Table 7 is of similar magnitude (45%), which is also the lowest estimate in the sample of countries. In the estimates for Austria, Belgium, Italy and Portugal the unobserved heterogeneity accounts for over 80% of the total error variance.

Other explanatory variables

The appendix reports the coefficient estimates for other control variables used in the analysis. In most countries, married women are less likely to work than single women. Only in Denmark, France, Finland and the UK is this not the case. In most countries being separated/divorced or widowed makes no significant difference in the participation probabilities compared with single women. Education has the expected impact on the probability of labour force participation with more educated women in all the countries being more likely to work.

The indicator variable for the presence of pre-teen children is negative and significant for the following countries: AU, DE, DK, FR, IR, NL, SP and the UK. This may be related to, for example, excess demand for formal childcare (for the UK evidence, see Chevalier & Viitanen, 2003 and for German evidence, Wrohlich, 2005). This is supported by the fact that the coefficient estimate for Finland is not statistically significant and that in Finland the municipalities have a legal requirement to provide a childcare place for any child requiring one. The presence of teenage children in the household reduces the probability of labour force participation in Germany, the Netherlands and the UK.

Bad health has a significant negative impact on participation in most countries, except for Belgium, France, Finland and Greece. This may indicate that disability legislation is stronger or better enforced in these countries or that individuals in poor health receive some other form of support to enable them to work. Further analysis would be of interest to examine the reasons for these differences. Household size has a negative impact on the probability of labour force participation in BE, DE, FR, IR, IT, NL, PT and SP. This partly captures the number of children in the household but may also indicate that the household includes inhabitants from more than two generations.

All of the estimated dynamic models parameterise the unobserved individual effect as a function of mean of time-varying regressors, the correlated effects and a dummy variable for the first period observation on the dependent variable. The correlated effects reported in the appendix allow us to examine which of the control variables are correlated with the unobserved heterogeneity. The presence of pre-teen children is significant only in Germany and Ireland as well as in Spain in the random effects specification and in Belgium in the pooled probit specification. The presence of teenage children is positively correlated with the unobservables in Denmark, the Netherlands and the UK as well as Spain in the random effects specification. Bad health is correlated with the unobserved heterogeneity in FR, IR, NL, PT, SP and the UK as well as FI in the random effects specification only. Finally, the mean of the informal elderly care is significant only Ireland as well as in Italy and Portugal in the random effects specification only.

Feedback effects

A drawback of the random effects estimation is the assumption of strict exogeneity of the explanatory variables. A simple test to examine whether this assumption holds is to test for feedback effects from CAREt+1 to LFPt. While the complete regression results are not reported (these are available from the author on request), a summary of this test is reported in the bottom of Table 7. The countries for which there are significant feedback effects include Belgium, France, Italy (all at 5% levels) and the UK (at a 10% level of significance). The presence of feedback from the explanatory variables renders the random effects estimates potentially biased. Nevertheless, for these countries the pooled estimator is consistent, although inefficient, as it avoids the strict exogeneity assumption. For example, the pooled estimator is robust to serial correlation. A similar allowance for serial correlation in the idiosyncratic error term for the random effects model requires estimation using Maximum Simulated Likelihood Estimation, which is beyond the scope of this paper.

Table 9. Attrition-corrected estimates for selected countries

	AU	BE	DK	FI	IR	PT	UK
Pooled probit – no attrition correction							
LFP_{T-1}	**1.188**	**2.111**	**1.373**	**1.549**	**1.474**	**1.064**	**2.029**
	(0.049)	**(0.075)**	**(0.076)**	**(0.075)**	**(0.050)**	**(0.040)**	**(0.044)**
	[0.217]	**[0.354]**	**[0.252]**	**[0.321]**	**[0.196]**	**[0.156]**	**[0.399]**
CARE	0.019	-0.138	-0.065	-0.180	-0.103	**-0.251**	-0.106
	(0.129)	(0.151)	(0.162)	(0.113)	(0.137)	**(0.088)**	(0.060)
	[-0.000]	[-0.000]	[-0.001]	[-0.001]	[-0.001]	**[-0.003]**	[-0.002]
Log likelihood	-4052.3	-1728.5	-1537.4	-1756.7	-3699.4	-5712.4	-4438.5
Pooled probit – IPW attrition correction							
LFP_{T-1}	**0.858**	**2.037**	**1.329**	**1.175**	**1.430**	**1.046**	**1.972**
	(0.061)	**(0.090)**	**(0.092)**	**(0.120)**	**(0.053)**	**(0.049)**	**(0.065)**
	[0.162]	**[0.350]**	**[0.238]**	**[0.229]**	**[0.192]**	**[0.160]**	**[0.386]**
CARE	-0.106	-0.259	0.128	0.086	-0.156	**-0.216**	-0.010
	(0.166)	(0.166)	(0.186)	(0.197)	(0.144)	**(0.086)**	(0.082)
	[-0.001]	[-0.001]	[0.001]	[0.001]	[-0.001]	**[-0.002]**	[-0.000]
Log likelihood	-4556.6	-1815.3	-1377.0	-2086.1	-3698.4	-5354.9	-4679.6

Notes: Coefficient estimates with standard errors in parentheses. Average partial effects reported in square brackets.

Source: Author calculations based on the ECHP.

The pooled estimator does not change the conclusion on the impact of CARE on labour force participation for the countries with feedback effects except for Italy. The results indicate a significant negative impact of informal caring in Italy, which are in line with the findings by Marenzi & Pagani (2004).

Attrition bias

Since the Verbeek & Nijman (1992) test for attrition indicated that exit from the ECHP may be non-random in some of the countries, attrition-corrected estimates have been proved here. Table 9 reports the pooled probit estimates without attrition correction and with the IPW attrition correction that was discussed in section 3. The results are provided for the coefficient estimates and, in square brackets, the average partial effects.

Non-random attrition from the panel does not affect the estimates for informal care as for most countries they remain insignificant. For Portugal, the estimate for informal elderly care is statistically significant with the magnitude reduced slightly with the IPW correction. Regarding the estimates of state dependence in labour force participation, however, both Austria and Finland exhibit that non-random attrition from the panel indeed biases the estimates considerably. For Austria, the state dependence reduces from 21.7 to 16.2 percentage points and in Finland from 32.1 to 22.9 percentage points after correcting the estimates for attrition.

Sub-sample analysis

As shown in the descriptive analysis (Figure 1), the impact of CARE may be influenced by the age of the respondent, with older women being more likely to care for an elderly person – e.g. their own or their partner's parent(s). Further, single women may be more likely to care for an elderly person as a result of fewer commitments competing for their time. To investigate these possibilities further, the sample is split into age groups (20-29, 30-39, 40-49 and 50-59) and also into marital status groups (married or single) based on the characteristic at the first wave.[13] The estimates for separated/divorced women were not significant in any country and hence the estimates are not reported. For each sub-sample a dynamic pooled probit model controlling is estimated for the initial conditions and correlated effects. The estimates for AU, BE, DK, FI, IR, PT and UK are corrected for non-random panel attrition with IPW correction.

It is likely that the impact of CARE on LFP varies by the individual characteristics of the respondent. Specifically, it is reasonable to assume that informal caring will be less of a choice for more mature women and thus possibly more of an employment constraint. In the following analysis, this hypothesis is confirmed for several countries. Table 10 presents the coefficient estimates and the corresponding standard errors of a dynamic pooled probit with IPW correction for countries that have a potential attrition bias. The complete regression results are available on request.

Middle-aged women in many of the countries in the sample are constrained in their labour force participation owing to informal elderly care: 45-49 year old women in Germany exhibit significant negative effects and a 10% level of significance in Austria, France, Greece and Portugal. Figure 1 shows that the incidence of caring increases dramatically from age 40 onwards reaching a peak in the mid-50s. Although this analysis does not constitute a proper test of causality, it is noteworthy to point out that that from mid-40s onwards LFP also decreases considerably, which could indicate causality. Furthermore, this is not likely to be a cohort effect since the state dependence estimates for 40-59 year olds are all of similar magnitude regardless of age cohort.

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[13] The group 'widowed' is too small in most countries for consistent analysis.

Table 10. Impact of CARE on LFP by age group and marital status

	AU	BE	DE	DK	FR	FI	GR	IR	IT	NL	PT	SP	UK
Age group													
20-39	-0.167	-0.376	-0.482	-0.264	-0.321	0.314	-0.062	-0.430	**-0.526**	0.245	-0.201	-0.033	-0.073
	(0.377)	(0.305)	(0.340)	(0.497)	(0.209)	(0.477)	(0.358)	(0.320)	**(0.145)**	(0.387)	(0.174)	(0.180)	(0.146)
40-44	0.104	0.156	-0.372	0.436	0.079	**0.911**	-0.081	-0.466	-0.006	-0.609	-0.044	-0.124	0.146
	(0.363)	(0.353)	(0.337)	(0.437)	(0.245)	**(0.318)**	(0.281)	(0.401)	(0.216)	(0.466)	(0.183)	(0.192)	(0.223)
45-49	-0.470	0.037	**-0.703**	0.280	-0.417	0.123	-0.524	0.007	-0.048	-0.217	-0.382	0.114	-0.139
	(0.272)	(0.364)	**(0.287)**	(0.453)	(0.221)	(0.265)	(0.323)	(0.256)	(0.163)	(0.316)	(0.204)	(0.145)	(0.204)
50-54	-0.285	**-1.107**	-0.316	0.170	-0.153	0.136	0.083	0.195	-0.254	0.022	-0.329	-0.071	0.213
	(0.298)	**(0.319)**	(0.265)	(0.485)	(0.253)	(0.214)	(0.394)	(0.288)	(0.173)	(0.281)	(0.207)	(0.147)	(0.215)
55-59	0.197	0.044	0.092	0.113	-0.303	**-0.918**	0.104	-0.346	-0.323	0.527	-0.091	-0.265	0.016
	(0.309)	(0.406)	(0.188)	(0.325)	(0.247)	**(0.365)**	(0.240)	(0.257)	(0.276)	(0.380)	(0.230)	(0.180)	(0.256)
Marital status													
Married	-0.146	-0.332	**-0.275**	-0.002	**-0.207**	0.079	0.050	-0.244	**-0.266**	0.111	-0.159	-0.066	0.097
	(0.195)	(0.212)	**(0.127)**	(0.220)	**(0.106)**	(0.215)	(0.159)	(0.168)	**(0.105)**	(0.155)	(0.099)	(0.082)	(0.098)
Never married	-0.029	-0.079	**-1.256**	-0.144	-0.201	0.313	**-0.431**	-0.118	**-0.322**	**-0.586**	-0.295	-0.036	-0.320
	(0.388)	(0.316)	**(0.569)**	(0.443)	(0.238)	(0.489)	**(0.221)**	(0.284)	**(0.144)**	**(0.292)**	(0.200)	(0.131)	(0.221)

Notes: Pooled dynamic probit coefficient estimates with IPW correction for AU, BE, DK, FI, IR, PT, UK. Statistical significance at 5% level indicated in bold font.
Source: Author calculations based on the ECHP.

A few interesting peculiarities are present as well. First, young women in Italy are constrained in LFP due to elderly care. This may be caused by, for example, a clash of career-oriented and traditional roles or the prevalence of 'sandwich' generation women who have caring responsibilities both to the following and the preceding generations (Marenzi & Pagani, 2004). Second, Finnish women are constrained in LFP at a later age than women in the other countries in the analysis. This may be owing to, for example, better health of the elderly until a later age or later fertility for the parents' of the 55-59 year old respondents. Also, surprisingly, 40-44 year old Finnish women increase their labour force participation as a result of elderly care. This may be related to an income effect (whereas usually the substitution effect would prevail) or possibly resulting from the generous benefits for elderly care in Finland, which would not count as income for the carer.[14]

It is also informative and highly policy-relevant to examine the results by marital status. If, for example, unmarried women are constrained in their employment because of informal caring, then they themselves may incur a greater a risk of old-age poverty as a result of, for example, lower pension savings. Table 10 shows that this may indeed be an issue. Single women are constrained in labour force participation due to elderly care responsibilities in Germany, Greece, Italy and the Netherlands. Although married women also are constrained in Italy and Germany, the magnitude of the estimates is larger for single women.

5. Conclusions

This paper provides evidence on the impact of informal care-giving to the elderly on the labour force participation of women across 13 European countries. The previous analyses using the ECHP to examine this topic do not fully exploit the panel nature of the data and rely on strict assumptions regarding the unobservables, both at the individual and at the country level. The analysis in this paper has two focal points: the relative contributions of state dependence as well as observed and unobserved heterogeneity in explaining the dynamics in women's labour force participation and the existence and consequences of non-random attrition from the panel.

Non-random attrition from the ECHP is shown to exert a small bias in the results for state dependence in some of the countries used in the analysis. Nevertheless, the differences between the attrition-corrected estimates and those without correction show that the bias is not nearly as bad as what one could expect from the large raw attrition rates.[15] Hence, the effect of attrition may be absorbed into the initial conditions and correlated effects.

Allowing for persistence in labour force participation is important: estimates from models controlling for both spurious and true state dependence differ considerably from a simple static probit model. Models controlling for both observed and unobserved heterogeneity show substantial positive state dependence and unobserved permanent heterogeneity in women's labour force participation across the sample of countries. In the models, unobservable heterogeneity accounts for 45-86% of the unexplained variation in labour force participation.

The analysis by sub-samples for different age groups and marital status offer two key observations. First, as expected, elderly care responsibilities increase with age and constrain women from participating in the labour force during their middle age, which – owing to the significant positive state dependence – results in lower labour force participation until the

[14] It is worth pointing out that the positive impact for 40-44 year olds in Finland (sample size 1,102) is similar in magnitude (and significant) even without IPW attrition correction, however, in the random effects specification the coefficient is no longer significant.

[15] Ziliak & Kniesner (1998), using the PSID, also find a negligible influence of attrition bias in a model of life cycle labour supply.

retirement age. Second, single women with elderly care responsibilities may incur a greater risk of old-age poverty resulting from less attachment to the labour force and hence lower pension savings. The results indicate that this is a significant possibility in Germany, Greece, Italy and the Netherlands.

Overall the results indicate that informal elderly care decreases women's labour force participation in most of the 13 EU countries analysed at some point in their lifetime. The presence of state dependence means that short-term policy interventions, such as increased labour market flexibility to care for an elderly person, may have longer term implications. Measures to help women to combine caring responsibilities (both elderly care and child care) with labour market participation may provide the crucial policy instruments in many countries to attain the European Commission target of 60% employment rates for women.

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Appendix

Specifications for all countries also include controls for age groups: 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 (omitted: 20-24), region (except DE, NL) and wave.

Austria

	Static probit		Pooled probit		RE probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	0.083	0.115	0.019	0.129	0.157	0.204
LFP_{t-1}	–	–	1.188	0.049	0.667	0.068
MARS1	-0.789	0.088	-0.584	0.092	-1.120	0.188
MARS2	-0.094	0.130	-0.036	0.131	-0.271	0.281
MARS3	-0.297	0.212	-0.466	0.211	-1.052	0.422
KIDS_LT13	-0.537	0.076	-0.334	0.096	-0.671	0.152
KIDS_GT13	-0.156	0.079	-0.104	0.084	-0.183	0.151
HIQ1	0.941	0.127	0.904	0.130	2.197	0.268
HIQ2	0.420	0.065	0.374	0.066	0.733	0.154
Bad health	-0.510	0.135	-0.502	0.137	-0.552	0.230
HHSIZE	-0.054	0.022	-0.098	0.037	-0.084	0.049
$Work_0$	–	–	-0.052	0.064	1.098	0.170
Constant	1.945	0.155	0.725	0.179	2.503	0.376
Correlated effects						
KIDS_GT13	–	–	0.041	0.241	0.756	0.582
KIDS_LT13	–	–	-0.226	0.137	-0.231	0.285
Bad health	–	–	0.210	0.286	0.130	0.533
HHSIZE	–	–	0.071	0.045	-0.075	0.111
CARE	–	–	0.183	0.294	0.101	0.619
σ_a		–		–	2.415	0.119
P		–		–	0.854	0.012
Log likelihood		-5185.843		-4052.267		-2836.3
N		9,451		8,548		8,548

Source: Author’s calculations based on the ECHP.

Belgium

	Static probit		Pooled probit		RE probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.028	0.106	-0.138	0.151	0.155	0.224
LFPt-1	–	–	2.111	0.075	1.414	0.089
MARS1	-0.172	0.107	-0.226	0.115	-0.348	0.208
MARS2	-0.242	0.130	-0.245	0.128	-0.374	0.243
MARS3	0.867	0.318	0.611	0.382	0.629	0.583
KIDS_LT13	-0.089	0.062	0.053	0.084	0.005	0.115
KIDS_GT13	0.174	0.084	0.140	0.101	0.217	0.154
HIQ1	1.310	0.079	0.753	0.084	1.210	0.143
HIQ2	0.520	0.067	0.292	0.069	0.333	0.110
Bad health	-0.793	0.119	-0.425	0.177	-0.325	0.218
HHSIZE	-0.189	0.029	-0.305	0.069	-0.194	0.074
Work0	–	–	0.932	0.082	3.286	0.238
Constant	0.566	0.193	-0.904	0.222	-1.218	0.414
Correlated effects						
KIDS_GT13	–	–	0.083	0.244	0.450	0.489
KIDS_LT13	–	–	-0.441	0.207	-0.231	0.321
Bad health	–	–	-0.120	0.314	-0.917	0.550
HHSIZE	–	–	0.255	0.077	0.024	0.097
CARE	–	–	0.259	0.277	-0.269	0.509
σa		–		–	1.516	0.100
ρ		–		–	0.697	0.028
Log likelihood		-5144.553		-1728.526		-1519.589
N		10,040		8,231		8,231

Source: Author's calculations based on the ECHP.

Germany

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.166	0.089	-0.233	0.124	-0.612	0.243
LFPt-1	–	–	0.524	0.045	0.259	0.094
MARS1	-0.600	0.090	-0.483	0.110	-0.992	0.255
MARS2	-0.311	0.116	-0.324	0.138	-0.681	0.346
MARS3	-0.072	0.228	-0.182	0.215	-0.345	0.634
KIDS_LT13	-0.588	0.054	-0.298	0.065	-0.247	0.120
KIDS_GT13	0.102	0.095	0.212	0.113	0.439	0.236
HIQ1	0.695	0.078	0.623	0.089	1.477	0.234
HIQ2	0.165	0.051	0.168	0.059	0.271	0.144
Bad health	-0.507	0.094	-0.505	0.114	-0.542	0.235
HHSIZE	-0.261	0.023	-0.316	0.038	-0.653	0.074
Work0	–	–	0.887	0.059	3.425	0.228
Constant	1.367	0.122	0.121	0.172	0.493	0.461
Correlated effects						
KIDS_GT13	–	–	-0.219	0.235	-0.017	0.546
KIDS_LT13	–	–	-0.649	0.131	-1.861	0.322
Bad health	–	–	0.211	0.191	-0.744	0.462
HHSIZE	–	–	0.185	0.041	0.307	0.100
CARE	–	–	0.374	0.247	0.642	0.569
σa		–		–	2.482	0.130
ρ		–		–	0.860	0.013
Log likelihood		-4647.757		-2832.223		-2266.2
N		8,087		5,881		5,881

Source: Author's calculations based on the ECHP.

Denmark

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.085	0.133	-0.065	0.162	-0.032	0.210
LFPt-1	–	–	1.373	0.076	0.888	0.092
MARS1	0.069	0.088	-0.072	0.093	-0.120	0.131
MARS2	-0.047	0.110	-0.081	0.121	-0.189	0.170
MARS3	0.723	0.219	0.256	0.260	0.262	0.394
KIDS_LT13	-0.085	0.075	-0.247	0.141	-0.334	0.167
KIDS_GT13	0.099	0.113	-0.359	0.143	-0.473	0.190
HIQ1	0.889	0.080	0.529	0.085	0.651	0.125
HIQ2	0.523	0.074	0.283	0.076	0.365	0.112
Bad health	-1.067	0.114	-0.883	0.164	-1.159	0.196
HHSIZE	-0.070	0.031	-0.102	0.056	-0.090	0.069
Work0	–	–	0.696	0.085	1.761	0.177
Constant	0.397	0.139	-0.946	0.236	-1.188	0.295
Correlated effects						
KIDS_GT13	–	–	0.712	0.334	1.302	0.490
KIDS_LT13	–	–	0.023	0.217	0.189	0.298
Bad health	–	–	-0.511	0.303	-1.142	0.449
HHSIZE	–	–	0.190	0.066	0.175	0.088
CARE	–	–	0.134	0.278	0.066	0.417
σa		–		–	1.097	0.091
ρ		–		–	0.546	0.041
Log likelihood		-2943.841		-1537.398		-1446.893
N		8,167		6,489		6,489

Source: Author's calculations based on the ECHP.

France

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.228	0.082	-0.158	0.091	-0.163	0.131
LFP_{t-1}	–	–	1.873	0.039	1.293	0.044
MARS1	-0.080	0.052	-0.015	0.054	-0.081	0.074
MARS2	0.193	0.075	0.155	0.074	0.107	0.110
MARS3	0.282	0.121	0.185	0.092	0.262	0.172
KIDS_LT13	-0.101	0.047	-0.220	0.089	-0.329	0.093
KIDS_GT13	0.178	0.066	-0.057	0.093	-0.116	0.113
HIQ1	0.761	0.050	0.380	0.046	0.546	0.072
HIQ2	0.410	0.041	0.156	0.040	0.198	0.054
Bad health	-0.727	0.060	-0.134	0.075	-0.161	0.091
HHSIZE	-0.219	0.016	-0.126	0.035	-0.155	0.034
Work0	–	–	0.731	0.041	2.023	0.091
Constant	0.625	0.097	-0.585	0.112	-0.624	0.161
Correlated effects						
KIDS_GT13	–	–	0.208	0.135	0.465	0.199
KIDS_LT13	–	–	0.137	0.125	0.254	0.151
Bad health	–	–	-0.817	0.135	-1.564	0.208
HHSIZE	–	–	0.033	0.038	-0.020	0.044
CARE	–	–	-0.130	0.169	-0.356	0.298
σ_a		–		–	1.113	0.044
ρ		–		–	0.553	0.020
Log likelihood		-13325.059		-5715.577		-5300.593
N		23,354		19,194		19,194

Source: Author's calculations based on the ECHP.

Finland

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.131	0.105	-0.180	0.113	-0.359	0.227
LFP_{t-1}	–	–	1.549	0.075	0.843	0.092
MARS1	0.069	0.086	0.067	0.097	-0.006	0.139
MARS2	-0.160	0.120	-0.127	0.124	-0.302	0.189
MARS3	-0.085	0.235	-0.209	0.199	-0.467	0.350
KIDS_LT13	-0.279	0.085	-0.090	0.192	-0.277	0.209
KIDS_GT13	0.083	0.089	0.045	0.137	-0.087	0.196
HIQ1	0.615	0.076	0.367	0.082	0.549	0.126
HIQ2	0.276	0.073	0.175	0.078	0.213	0.115
Bad health	-0.533	0.123	-0.237	0.161	-0.191	0.221
HHSIZE	-0.115	0.031	-0.100	0.078	-0.256	0.081
$Work_0$	–	–	0.444	0.076	1.780	0.177
Constant	0.821	0.168	-0.349	0.232	-0.662	0.370
Correlated effects						
KIDS_GT13	–	–	0.074	0.240	0.303	0.371
KIDS_LT13	–	–	-0.093	0.227	-0.117	0.279
Bad health	–	–	-0.372	0.291	-1.128	0.442
HHSIZE	–	–	0.052	0.092	0.182	0.097
CARE	–	–	0.115	0.208	0.161	0.415
σ_a		–		–	1.259	0.096
ρ		–		–	0.613	0.036
Log likelihood		-3560.948		-1756.744		-1642.894
N		8,522		6,465		6,470

Source: Author's calculations based on the ECHP.

Greece

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.028	0.099	-0.071	0.122	-0.160	0.194
LFP_{t-1}	–	–	2.194	0.057	1.288	0.072
MARS1	-0.495	0.075	-0.283	0.090	-0.597	0.146
MARS2	0.339	0.144	0.178	0.144	0.332	0.263
MARS3	0.557	0.160	0.154	0.208	0.067	0.331
KIDS_LT13	-0.179	0.062	-0.047	0.112	-0.220	0.141
KIDS_GT13	0.018	0.065	-0.039	0.084	-0.152	0.126
HIQ1	1.164	0.066	0.590	0.065	1.005	0.114
HIQ2	0.426	0.056	0.180	0.052	0.394	0.093
Bad health	-0.590	0.113	-0.319	0.206	-0.420	0.231
HHSIZE	-0.057	0.022	0.019	0.052	0.003	0.061
$Work_0$	–	–	0.738	0.061	3.051	0.191
Constant	-0.652	0.130	-1.573	0.154	-2.246	0.259
Correlated effects						
KIDS_GT13	–	–	0.225	0.162	0.465	0.302
KIDS_LT13	–	–	-0.058	0.154	-0.009	0.225
Bad health	–	–	-0.206	0.278	-0.889	0.582
HHSIZE	–	–	-0.059	0.056	-0.094	0.077
CARE	–	–	0.205	0.243	0.489	0.444
σ_a		–		–	1.478	0.085
ρ		–		–	0.686	0.025
Log likelihood		-8186.0463		-2836.805		-2600.8975
N		14,968		11,834		11,834

Source: Author's calculations based on the ECHP.

Ireland

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.431	0.118	-0.103	0.137	-0.204	0.185
LFP_{t-1}	–	–	1.474	0.050	0.978	0.060
MARS1	-0.369	0.075	-0.142	0.082	-0.428	0.142
MARS2	-0.144	0.131	0.031	0.135	-0.204	0.213
MARS3	0.463	0.265	0.456	0.277	0.068	0.442
KIDS_LT13	-0.392	0.062	0.003	0.093	-0.258	0.106
KIDS_GT13	-0.057	0.067	0.033	0.075	-0.044	0.103
HIQ1	1.326	0.075	0.844	0.078	1.303	0.133
HIQ2	0.668	0.049	0.405	0.055	0.545	0.080
Bad health	-0.811	0.121	-0.390	0.193	-0.551	0.227
HHSIZE	-0.117	0.014	-0.175	0.031	-0.221	0.041
$Work_0$	–	–	0.686	0.062	2.400	0.128
Constant	0.592	0.125	-0.794	0.141	-0.636	0.246
Correlated effects						
KIDS_GT13	–	–	0.037	0.184	0.394	0.303
KIDS_LT13	–	–	-0.468	0.144	-0.502	0.205
Bad health	–	–	-1.110	0.446	-2.853	0.652
HHSIZE	–	–	0.132	0.037	0.120	0.054
CARE	–	–	-0.688	0.278	-1.501	0.459
σ_a		–		–	1.568	0.065
ρ		–		–	0.711	0.017
Log likelihood		-7132.153		-3699.354		-3056.291
N		13,210		10,402		10,402

Source: Author’s calculations based on the ECHP.

Italy

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.305	0.069	-0.207	0.081	-0.226	0.129
LFP_{t-1}	–	–	1.314	0.035	0.897	0.047
MARS1	-0.488	0.057	-0.337	0.064	-0.809	0.130
MARS2	0.147	0.137	0.067	0.145	-0.130	0.208
MARS3	0.574	0.164	0.460	0.152	0.528	0.362
KIDS_LT13	-0.034	0.048	0.044	0.064	-0.143	0.082
KIDS_GT13	0.075	0.050	0.144	0.054	0.103	0.090
HIQ1	1.495	0.081	1.289	0.096	2.896	0.200
HIQ2	0.817	0.041	0.640	0.045	1.288	0.082
Bad health	-0.242	0.064	-0.291	0.081	-0.244	0.118
HHSIZE	-0.118	0.017	-0.165	0.030	-0.098	0.037
$Work_0$	–	–	0.965	0.048	3.757	0.132
Constant	0.602	0.134	-0.653	0.168	-1.046	0.263
Correlated effects						
KIDS_GT13	–	–	0.003	0.158	0.548	0.309
KIDS_LT13	–	–	-0.114	0.106	0.135	0.183
Bad health	–	–	0.247	0.163	-0.191	0.267
HHSIZE	–	–	0.110	0.036	-0.074	0.051
CARE	–	–	-0.109	0.194	-0.908	0.436
σ_a		–		–	2.248	0.055
ρ		–		–	0.835	0.007
Log likelihood		-14703.799		-8035.899		-5226.8487
N		26,856		23,009		23,009

Source: Author’s calculations based on the ECHP.

Netherlands

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.374	0.108	0.001	0.133	-0.034	0.162
LFP_{t-1}	–	–	2.124	0.048	1.425	0.061
MARS1	-0.545	0.076	-0.371	0.069	-0.603	0.106
MARS2	-0.384	0.103	-0.140	0.090	-0.319	0.138
MARS3	-0.028	0.288	0.100	0.240	0.005	0.464
KIDS_LT13	-0.513	0.060	-0.484	0.097	-0.838	0.120
KIDS_GT13	-0.122	0.063	-0.201	0.080	-0.332	0.104
HIQ1	0.921	0.071	0.343	0.070	0.368	0.093
HIQ2	0.323	0.052	0.121	0.053	0.126	0.071
Bad health	-0.817	0.076	-0.411	0.113	-0.542	0.132
HHSIZE	-0.246	0.023	-0.116	0.046	-0.204	0.053
$Work_0$	–	–	0.710	0.047	2.040	0.126
Constant	1.266	0.117	-1.100	0.194	-1.010	0.234
Correlated effects						
KIDS_GT13	–	–	0.421	0.139	0.723	0.218
KIDS_LT13	–	–	0.185	0.135	0.414	0.188
Bad health	–	–	-0.783	0.190	-1.325	0.281
HHSIZE	–	–	0.102	0.051	0.161	0.065
CARE	–	–	-0.409	0.230	-0.585	0.336
σ_a		–		–	0.985	0.059
ρ		–		–	0.493	0.030
Log likelihood		-10063.813		-3910.049		-3802.942
N		17,490		14,369		14,369

Source: Author’s calculations based on the ECHP.

Portugal

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.293	0.090	-0.251	0.088	-0.179	0.140
LFP_{t-1}	–	–	1.064	0.040	0.656	0.052
MARS1	-0.263	0.076	-0.201	0.091	-0.454	0.132
MARS2	0.164	0.115	0.168	0.134	0.014	0.201
MARS3	0.681	0.138	0.385	0.146	-0.109	0.224
KIDS_LT13	-0.081	0.056	0.047	0.064	0.030	0.086
KIDS_GT13	-0.053	0.057	0.010	0.055	-0.018	0.089
HIQ1	1.603	0.156	1.594	0.195	2.718	0.252
HIQ2	0.613	0.084	0.505	0.092	0.672	0.150
Bad health	-0.577	0.057	-0.306	0.066	-0.340	0.088
HHSIZE	-0.115	0.017	-0.141	0.030	-0.077	0.034
$Work_0$	–	–	0.679	0.056	2.793	0.121
Constant	0.999	0.130	-0.043	0.166	0.380	0.307
Correlated effects						
KIDS_GT13	–	–	0.038	0.211	0.025	0.318
KIDS_LT13	–	–	-0.118	0.128	0.013	0.223
Bad health	–	–	-0.541	0.142	-2.363	0.275
HHSIZE	–	–	0.057	0.039	-0.197	0.073
CARE	–	–	-0.172	0.236	0.856	0.445
σ_a		–		–	2.126	0.067
ρ		–		–	0.819	0.009
Log likelihood		-8576.428		-5712.376		-3842.8
N		15,091		13,125		13,125

Source: Author’s calculations based on the ECHP.

Spain

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.146	0.061	-0.077	0.067	-0.021	0.104
LFP_{t-1}	–	–	1.606	0.039	0.861	0.047
MARS1	-0.668	0.057	-0.450	0.056	-0.789	0.093
MARS2	0.060	0.095	-0.050	0.091	-0.170	0.155
MARS3	0.793	0.145	0.380	0.153	0.122	0.282
KIDS_LT13	-0.188	0.047	0.046	0.068	-0.264	0.084
KIDS_GT13	-0.042	0.048	0.081	0.055	-0.028	0.077
HIQ1	1.137	0.050	0.700	0.048	1.089	0.080
HIQ2	0.496	0.046	0.289	0.043	0.469	0.067
Bad health	-0.387	0.060	-0.155	0.077	-0.218	0.100
HHSIZE	-0.098	0.014	-0.114	0.027	-0.104	0.033
$Work_0$	–	–	0.690	0.044	2.316	0.103
Constant	0.066	0.104	-1.080	0.126	-1.072	0.198
Correlated effects						
KIDS_GT13	–	–	0.145	0.135	0.551	0.240
KIDS_LT13	–	–	-0.091	0.105	0.373	0.151
Bad health	–	–	-0.329	0.133	-0.824	0.234
HHSIZE	–	–	0.069	0.031	-0.029	0.044
CARE	–	–	-0.043	0.150	-0.365	0.265
σ_a		–		–	1.391	0.050
ρ		–		–	0.659	0.016
Log likelihood		-12074.621		-5963.402		-5293.533
N		23,581		18,889		18,889

Source: Author's calculations based on the ECHP.

United Kingdom

	Static probit		Pooled probit		RE Probit	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
CARE	-0.176	0.053	-0.106	0.060	-0.141	0.083
LFP_{t-1}	–	–	2.029	0.044	1.399	0.054
MARS1	0.064	0.066	-0.048	0.056	-0.062	0.086
MARS2	-0.155	0.080	0.047	0.065	0.022	0.101
MARS3	0.251	0.184	0.139	0.140	0.112	0.253
KIDS_LT13	-0.776	0.052	-0.507	0.085	-0.809	0.101
KIDS_GT13	-0.127	0.063	-0.196	0.073	-0.322	0.100
HIQ1	0.428	0.047	0.133	0.037	0.221	0.056
HIQ2	0.246	0.052	0.095	0.048	0.111	0.065
Bad health	-0.753	0.053	-0.340	0.066	-0.424	0.074
HHSIZE	-0.176	0.019	-0.018	0.031	-0.059	0.039
$Work_0$	–	–	0.544	0.044	1.532	0.096
Constant	0.939	0.114	-0.860	0.124	-0.778	0.178
Correlated effects						
KIDS_GT13	–	–	0.530	0.153	0.879	0.226
KIDS_LT13	–	–	-0.029	0.119	-0.018	0.159
Bad health	–	–	-0.597	0.116	-1.061	0.167
HHSIZE	–	–	0.041	0.036	0.081	0.050
CARE	–	–	-0.010	0.094	-0.058	0.148
σ_a		–		–	0.904	0.050
ρ		–		–	0.450	0.027
Log likelihood		-10156.799		-4438.490		-4320.942
N		18,227		15,220		15,220

Source: Author's calculations based on the ECHP.

REVISER – Research Training Network on Health, Ageing and Retirement

REVISER was launched by several members of the ENEPRI network in August 2003. The project was financed under the programme on Improving the Human Research Potential & the Socio-Economic Knowledge Base of the 5th EU Research Framework Programme.

The **REVISER** project finances training stays for young researchers in the following six research institutes:

- **CEPS** (Centre for European Policy Studies), Brussels
- **CPB** (Netherlands Bureau for Economic Policy Analysis), The Hague
- **DIW** (Deutsches Institut für Wirtschaftsforschung), Berlin
- **ETLA** (the Research Institute of the Finnish Economy), Helsinki
- **FEDEA** (Fundación de Estudios de Economía Aplicada), Madrid
- **LEGOS** (Laboratoire d'Economie et de Gestion des Organisations de Santé, Université de Paris-Dauphine), Paris

Trainees participate in research conducted in the areas of population ageing, health and retirement in the institutes in which they are placed, often in the context of common research projects developed by consortiums of ENEPRI partners. Trainees must be nationals of an EU member state or associated state, or must have resided in the EU for at least five years immediately prior to their appointment. This network aims at fostering the mobility of researchers. Thus, trainees must not be nationals of the state in which the institute appointing them is located and must not have carried out their normal activities in that state for more than 12 of the 24 months prior to the appointment.

This project is coordinated by Jorgen Mortensen, Associate Senior Research Fellow at CEPS. For further information, contact him at: jorgen.mortensen@ceps.be.

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