Direct and Indirect Effects of Disability on Employment Probabilities:

A Comparative Analysis

Abstract

The socio-economic debate stresses the need to empower people with disabilities, particularly in terms of employment probabilities. Although the existing literature primarily examines the direct effects of disability, we extend the focus by also analyzing the indirect effects of disability, i.e., the way individuals' employment probability is affected by the presence of disabled member(s) of their household. We perform a comparative analysis among four major Western European Countries, i.e., Italy, Spain, France and the UK, using EU SILC panel data for the period 2007-2010. We find negative direct effects of disability on employment probabilities in all four countries. Receiving disability benefit contributes to decrease the employment probabilities; nevertheless, a negative "pure" effect because of disability persists.

We also find evidence of significant indirect effects, i.e. the employment probability is also affected by the presence of other household members with disability. In particular, we show higher volatility for females compared to males and mixed signs and magnitudes across countries. Different institutions, policies and household behavior contribute to explaining cross-country differences.

Keywords: Disability, employment probabilities, caring activities, disability benefits, state dependence, country differences.

1. INTRODUCTION

The socio-economic debate on disability has increased considerably in the last decade. The European Disability Strategy 2010-2020 (European Commission 2010) notes that at the beginning of this century, one in six people in the EU had a disability, and this rate almost doubles for elderly people, revealing that the aging process in developed societies is not always accompanied by a healthy life. The European Strategy, with the aim of empowering people with disabilities, focuses on eliminating barriers, including those related to employment. This is essential because the employment rate and, more generally, the labor market participation rate of individuals who report having disabling conditions is generally low, beyond the effects of the economic crisis. In addition, OECD (2010) stresses that favoring the labor market integration of disabled people is a "win-win" policy because it potentially increases social inclusion and incomes and provides for a more effective labor supply and positive effects for economic output in the long term.

Given these premises, it is not surprising that an increasing number of studies investigate the relationship between having a disability and employment (or labor force participation).

The literature has usually focused on the direct effect of disability, i.e., the way individuals' employment probability is affected by their own disability (see Jones 2008 for a review). However, disability not only has direct effects but also may have indirect effects, i.e., the way the employment probability of individuals is affected by the presence of a disabled member(s) in their household.

Therefore, our primary novel contribution is the focus on the indirect effects of disability. This could be a relevant issue particularly when policies and institutions that support disabled people are inadequate, and the consequences of living with disabled people relapse on working-age household members through caring activities. In addition, we perform an innovative comparative analysis among four major Western European countries, i.e., Italy, Spain, France and the UK[1]. Cross-country differences include the welfare system (Huys 2013), several legislative and policy aspects (Eichhorst et al. 2010), household behaviors (CESifo 2010) and social norms. These factors are particularly important because the sign, the significance and the magnitude of

[1] For example, expenditure in disability varies from 0.8% of GDP in France and Italy and raises up to 1.3% in Spain and 2.4% in UK (Eurostat, 2010).

the net (both direct and indirect) effects of disability depend on the relevance of combined specific factors that affect employment.

Our analysis uses longitudinal data, which are relevant for two reasons. First, given that current employment may also be influenced by past employment, we can account for state dependence. Second, the panel data allow us to analyze both shorter and longer term effects of disability by including current and lagged disability statuses. Furthermore, with the aim of highlighting differences in household behavior, our analyses separate males and females, who may differ in household time allocation, caring activities and labor market performance. Finally, we analyze the role of disability benefits in affecting the employment probabilities of both disabled individuals and household members living with disabled individuals.

Our study defines disability in the spirit of the social model, which sees disability as a reduced form of the interrelations among impairment, technical help and the environment, leading to activity limitations (Mitra 2008). In that direction, our empirical analysis is based on the 2007-2010 longitudinal component of the EU-SILC data (Eurostat 2010), which contain cross-country homogenous information on limitations in the daily activities of surveyed individuals and therefore on disability.

To avoid being mixed up with education enrollment issues, we limit our analysis to individuals aged 25 to 64 years. Following the recent literature that focuses on the relationship between disability and employment (or labor force participation), our empirical strategy consists of estimating a dynamic random effects probit model that accounts for endogenous initial conditions (Heckman 1981) and allows us to obtain consistent estimates of state dependence and relevant explanatory variables. In addition, we explicitly distinguish between shorter and longer term effects of disability in cases of direct (see Gannon 2005 and Oguzoglu 2010) and indirect effects of disability.

Estimates suggest, consistent with the previous literature, the existence of negative direct effects of disability on employment probabilities, just partially explained by the role of disability benefits. We also find evidence of significant indirect effects, which show higher volatility for females compared to males and mixed signs and magnitudes across countries.

Section 2 discusses the underlying mechanisms that connect disability and employment, Section 3 provides the econometric approach used, Section 4 describes the data and the samples, Section 5 discusses the results and particularly the direct and indirect effects of disability, and Section 6 concludes.

2. THE BACKGROUND

There are a number of underlying mechanisms that can explain why disability may affect employment probability through both direct and indirect effects. In both cases, the observed outcome corresponds to the net effect of single factors that, in turn, have positive and negative effects on employment.

With regard to direct effects, the standard labor-leisure choice model assumes that disability may affect the budget's constraint, and it is likely to be associated with special/additional consumption requirements (She and Livermore, 2007). Furthermore, special consumption needs may increase the marginal utility of consumption, reshaping individual preferences. In both cases, we could expect a positive effect of individuals' own disability on their labor supply.

From a demand-side perspective, a positive effect on the employability of disabled people may derive from active labor market policies (e.g., public employment services, training schemes and employment subsidies) aimed at favoring the integration of disabled people into the labor market (e.g., Eichhorst et al. 2010).

On the contrary, there are factors that may negatively affect the employment probabilities of disabled individuals; i.e., labor supply may decrease because of the income effect related to the reception of disability benefits or because of the substitution effect deriving from the higher opportunity costs of working associated with disability (e.g., because of higher mobility costs). Additionally, an increase in the marginal utility of leisure (and thus a decrease in labor supply) may derive from the special time requirements for self-care/rehabilitation activities associated with disability (Mizunoya and Mitra 2013). In addition, according to the job-search model, the higher mobility costs faced by disabled people may decrease their job search intensity and thus reduce their employment perspective. Finally, from a demand-side view, employers would be less likely to hire disabled people because disability is likely to be associated with lower productivity and extra costs for adjusting workplaces to disability requirements. In addition, prejudice and/or discrimination by employers may negatively affect the employment perspective of disabled people.

This theoretical puzzle has been disentangled by a number of empirical works that focus on developed (Kidd et al. 2000 and Jones et al. 2006 for the UK, Gannon 2005 for Ireland, Jones et al. 2006 for Wales, Oguzoglu 2010 for Australia, Addabbo et al. 2014 and Agovino et al. 2014 for Italy) and developing countries (Mizunoya and Mitra 2013). The evidence that has emerged primarily indicates a negative effect of disability on employment (or labor force participation), suggesting the prevalence of both supply- and demand-side negative factors, including the limited effectiveness of labor policies.[2]

However, although the direct negative effects of disability on individuals' own employment probability is supported by well-established results, labor and health economists have given less attention to the indirect effects of disability (see Parodi and Sciulli 2008 for a study based on cross-sectional data). This aspect becomes more relevant once it is considered that the aging process in Western societies is not always accompanied by a healthy life, which results in increasing rates of disability among elderly people. Due to a lack of effective public/private support policies for disabled people, caring activities are transferred to household members, with possible detrimental effects for their labor supply.

Similar to above, extending the model predictions to allow for interactions among household members (e.g., Killingsworth and Heckman 1986), the special/additional consumption needs of disabled household members determine an increase in household consumption, possibly inducing positive indirect effects on the employment probabilities of non-disabled members. On the contrary, monetary transfers associated with disability or caring activities to support disabled household members may reduce labor supply, particularly due to the lack of adequate public services to support disabled people. From a demand-side perspective, it cannot be disregarded that individuals living in households with disabled members are possibly subjected to lower hiring rates if employers know that disabled people live in their house and suspect that this may imply lower productivity and/or higher absence rates from work.

The sign of the indirect effect of disability would be positive or negative depending on the prevalence of factors increasing or decreasing the employment rate of individuals living in households with disabled members. Disentangling this puzzle requires an empirical investigation, which may provide information on the sign, the significance and the magnitude of the investigated effects. In this context, conducting a cross-

[2] An increasing number of studies have stressed the negative effect of poor health conditions on employment or participation rates (e.g., Cai et al. 2014).

country analysis and separating individuals by gender can be particularly important to highlight the relevance of institutions, policies, and household behavior due to societal constraints and social norms, which sometimes appoint females as having a dominant role in child and family care (e.g., Hersch and Stratton 2002).

3. THE ECONOMETRIC MODEL

The probability of individual *i* being employed at time *t* is estimated by applying a random effects dynamic probit model on a balanced sample. The inclusion, among covariates, of the previous employment status allows us to disentangle the contribution to employment probabilities of unobserved heterogeneity and past employment (state dependence), and it allows us to interpret our model as a first-order Markov process.

The latent variable of the estimated model is specified as follows:

$$y_{it}^{*} = \gamma y_{it-1} + x_{it}^{'}\beta + \lambda_1 DIS_{it} + \lambda_2 DIS_{it-1} + \delta_1 OHMDIS_{it} + \delta_2 OHMDIS_{it-1} + \alpha_i + u_{it}$$
$$y_{it} = 1\left[y_{it}^{*} > 0\right] \quad (1)$$

with $i = 1,\ldots, N$, indicating the individual, and $t = 2\ldots T$, indicating the time periods. The dependent variable, *y*, takes value one if an individual *i* is employed at time *t*. x_{it} is a vector of control variables, β is a vector of unknown parameters to be estimated, α_i is the individual specific and time-invariant random component, and u_{it} is the idiosyncratic error term. We assume that both α_i and u_{it} are normally distributed and independent of x_{it} and that there is no serial correlation in u_{it}.

In addition, we include two vectors of disability dummy variables, DIS_{it} and $OHMDIS_{it}$, indicating, in turn, an individual's own disability, an individual's own strong disability, and an individual's household member's disability and an individual's household member's strong disability.[3] Those dummy variables allow us to measure, respectively, the direct and the indirect effect of (different levels of) disability on individuals' employment probability. We also include lagged variables of individuals' own and other household members' disability (DIS_{it-1} and $OHMDIS_{it-1}$), and this allows us to disentangle the shorter and

[3] The level of disability is defined considering the individual level of activity limitations. We have a dummy variable for individuals with limitations in their usual activities, i.e., disability, and a dummy variable for individuals strongly limited in usual activities.

longer term effects of disability on employment. Finally, λ_1, λ_2, δ_1, and δ_2 indicate four vectors of unknown parameters to be estimated in relation to current and past disability dummy variables.

Equation (1) assumes the exogenous initial conditions and therefore the independence between α_i and y_{it-1}. However, because it is most likely that the initial employment status is not randomly assigned to the individual, estimates obtained from equation (1) would be inconsistent. With the aim of providing consistent estimates, we follow the method proposed by Heckman (1981)[4], which explicitly accounts for the initial conditions problem. The Heckman estimator requires a simultaneous two-stage procedure. In the first stage, a reduced form equation, approximating the conditional distribution of the initial conditions, takes the following form:

$$y_{i1} = 1\left[z_{i1}^{'}\pi + \xi_{i1} > 0\right] \tag{2}$$

where z_{i1} is a vector of exogenous variables, including x_{i1} control variables, DIS_1 disability dummy variables, and an additional instrument,

$$\xi_{i1} = \theta\alpha_1 + \omega_i \tag{3}$$

correlated with α_i but uncorrelated with ω_i for t > 1.

The joint probability of the observed binary sequence for individual *i*, given the unobserved heterogeneity term, is:

$$\Phi\left[\left(z_{i1}^{'}\pi + \theta\alpha_i\right)\left(2y_{i1} - 1\right)\right]\prod_{t=2}^{T}\Phi\left[\left(\gamma y_{it-1} + x_{it}^{'}\beta + \lambda_1 DIS_{it} + \lambda_2 DIS_{it-1} + \delta_1 OHMDIS_{it} + \delta_2 OHMDIS_{it-1} + \alpha_i\right)\left(2y_{it} - 1\right)\right] \tag{4}$$

It follows that the likelihood function to be maximized is defined as:

$$L = \prod_i \int_{\alpha/\sigma_\alpha} \Phi\left[\left(z_{i1}^{'}\pi + \theta\alpha_i\right)\left(2y_{i1} - 1\right)\right]\prod_{t=2}^{T}\Phi\left[\left(\gamma y_{it-1} + x_{it}^{'}\beta + \lambda_1 DIS_{it} + \lambda_2 DIS_{it-1} + \delta_1 OHMDIS_{it} + \delta_2 OHMDIS_{it-1} + \alpha_i\right)\left(2y_{it} - 1\right)\right] dF\left(\alpha/\sigma_\alpha\right) \tag{5}$$

To obtain an estimate of the extent of both state dependence and the effect of individuals' own disability and their household members' disability, we need to calculate the average partial effect (APE) following the method suggested by Stewart (2007).

[4] Akay (2012) showed that the Heckman's estimator performs better for short panels, and we rely on it in our paper.

4. DATA AND SAMPLE

Our data are from the EU-SILC panel, which is a rotating panel survey based on harmonized methodology and definitions across most members of the European Union (Eurostat, 2010). The topics covered by the survey are living conditions, income, social exclusion, housing, work, demography, and education.

The rotation scheme of the EU-SILC reduces the risk of attrition, i.e., the unit non-response of eligible persons or households that occurs after the first wave of the panel (Rendtel, 2002). As suggested by Eurostat (2010), we checked for the presence of attrition by examining specific variables on the household membership status (and its changes), and we can reasonably exclude that there is attrition in our data.

The sampled units (households) to be added each year and the whole sample in the first wave of the survey are selected according to two-stage stratified sampling designs, i.e., municipalities and households. We focus on the population aged 25 to 64 years. The models are estimated by gender and separately by country. The effective (balanced) sample sizes for men and women are 9,000 and 9,373 in Italy, 6,896 and 7,571 in Spain, 11,172 and 12,592 in France, and 2,601 and 3,018 in the UK.

We are interested in the estimation of the direct and indirect effects of disability on the employment probabilities of both genders. Disability, indeed, affects employment rates, and there is a gender gap in those effects. Table 1 displays the average (over the whole period analysed) employment rates computed in our samples by country and gender for each level/degree of activity limitation of the individual (direct effects) and of his/her household members (indirect effects). The rates are higher for men who are not disabled and are without disabled household members, particularly in the UK. Strong disability strongly affects the employment rates of both genders in all countries examined. Notably, this is the case particularly for Italian females and British males, who show similar employment rates. Again, in the UK, a strong disability more strongly affects the employment rates of males than females, whereas the opposite is true in the other countries.

[Table 1 about here]

Table 2 reports the summary statistics by country and gender for the variables used in the econometric analysis, including the prevalence of disability[5]. The dependent variable is the employment rate/probability.

[5] On average, more than 10% of male and females in our samples reports activity limitations (disability).

There is a gender gap in employment rates, measured as the difference between male and female employment rates, and females are disadvantaged (lower employment probabilities) in all countries examined, albeit to different extents. Italy and Spain show the highest values of the gender gaps, whereas the gaps in France and the UK are remarkably lower.

As stated in the introduction, our analysis of the direct and indirect effects of disability is based on individuals' self-reported limitations in activities because of health problems at the time of the interview. We use dummy variables for individuals' own (and strong own) disability and for the disability (and strong) of their household members. Past employment accounts for state dependence, whereas individuals' lagged own and household members' disability allows us to disentangle the shorter and longer term effects of disability on employment probabilities. However, because disability is self-reported, and a self-reporting bias problem may arise (see Kerkhofs and Lindeboom 1995 for similar problems with self-reported health), we test (Tables A1-A3) the robustness of cut-point shifts with respect to a number of relevant explanatory variables (e.g., Contoyannis et al. 2004).[6] We find that our measure of disability is robust to alternative specifications and, generally, to self-reporting bias. Another concern with our analysis is related to the possibility that unobserved individual or household factors simultaneously drive employment and disability variables. We test this circumstance estimating the correlation between the error terms in a two-equation framework, where employment and disability equations are estimated jointly using, respectively, a dynamic pooled probit model and a dynamic pooled ordered probit model[7]. The estimates, reported in Table A4, are reassuring regarding the goodness of our estimation results. We find significant, but moderated, correlations between error terms just for French and British females when estimating direct effects and for French females when estimating indirect effects. In addition, the estimation results are consistent with those obtained using our benchmark model.

We distinguish between four age groups (25-34, 35-44, 45-54, and 55-64) and three educational variables defined according to UNESCO's International Standard Classification of Education (ISCED). The EU-SILC

[6] Because the literature suggests that the dynamics of disability may be influenced by age, educational status, and income, we investigate the issue of self-reporting bias by splitting the sample of males and females in all countries examined into subsamples based on those factors. For each subsample, we estimated dynamic random effects probit models controlling for initial conditions and correlated effects. Our findings (Tables A1-A3) confirm that the effect of disability on those subsamples does not change significantly.

[7] We rely on pooled models, without directly accounting for unobserved heterogeneity, to avoid computational burden.

distinguishes between education completed in the lower secondary stage (ISCED 0-2), upper secondary education (ISCED 3), and post-secondary or tertiary education (ISCED 5-7). We also control for marital status, the presence and number of children by age in the household, i.e., 0-3 years old and 4-15 years old, and for the equivalized household income deflated at 2007 prices.[8] The business-cycle effect is controlled for by introducing the regional unemployment rates (NUTS2 level).[9]

[Table 2 about here]

5. RESULTS

We present two sets of estimations of random-effects dynamic probit models on balanced samples for the relationship between disability and employment:[10] one where we control only for state dependence (lagged employment) and the current and lagged disability of individuals' own and of their household members' (*base model*) and one where we add individual and household controls (e.g., age, education level, marital status, number of children aged [0,3] and/or [4,15] in the household, equivalized household income), and regional unemployment rates (*complete model*). We estimate male and female subjects separately in all countries examined for the period 2007-2010. Each table contains both base and complete models by gender for all countries examined. We display state dependence and direct and indirect effects.

In Table 3, state dependence suggests that previous employment has a significant positive effect on current employment for both genders and in all countries examined and therefore that (even after controlling for observed and unobserved differences among individuals) employment in the previous year is associated with a higher probability of employment in the current year. This effect is similar for men and women and across countries in the base model. The effect of previous employment decreases when we estimate the complete

[8] We use the Consumer Price Index specific to the different countries analysed.

[9] NUTS is the acronym of "Nomenclatura delle unità territoriali statistiche". It is a classification of the geographical units introduced by Eurostat. Specifically, we refer to the second level of disaggregation, NUTS2, corresponding to the region.

[10] We also estimated dynamic pooled probit models with robust standard errors. Nonetheless, given that the main findings were in line with our benchmark model, and given that dynamic pooled probit models do not allow us to explicitly account for the initial conditions problem, we decided to use the model proposed by Heckman (1981).

model, likely because the control variables absorb part of the effect of state dependence for all gender-country combinations, with some exceptions.

[Table 3 about here]

Regarding the direct effects of disability (Table 4), we see that strong ability limitations significantly reduce the employment probabilities of both genders in all countries. The effect is higher for men than women, particularly in Italy and Spain. Once we add all the control variables (complete model), the direct effects of (strong) disability decreases in Italy, Spain and France, whereas the opposite is true in the UK. In this country, indeed, the effect of disability becomes stronger, particularly for males. In general, and in line with expectations, the lagged direct effects of disability are lower. This is likely due to the integration of the disabled people in the labour market. The lagged effects are lower particularly in France and the UK.

[Table 4 about here]

Finally, we find mixed evidence concerning the indirect effects of disability (Table 5). First, when estimating the complete model, some parameters lost their significance compared to those obtained with the base model. This finding suggests that the relationship between individuals' employment probabilities and the disability of their household member(s) is importantly intermediated by individual, household and job-related factors. Second, we find evidence for a relevant negative effect on British males. Indirect effects on females are mixed (and show higher volatility compared to the ones for males); we find a negative effect on Italian and Spanish females and a positive one in favor of both French and British women. Again, in the UK, there is an increase in the negative effect of (indirect) disability once the complete model is estimated.

[Table 5 about here]

Finally, Tables 6 and 7 include estimations accounting for the role of disability benefits.

[Tables 6 and 7 about here]

5.1 Discussion

Direct Effects

The estimates of the direct effects of disability suggest (Table 4), consistently with previous literature, the existence of negative direct effects of disability on employment probabilities, with mixed magnitude across

countries. The effects of having a current disability are high for both genders in Spain, France and the UK, reducing the probability of current employment significantly. In those countries, disability has a greater negative effect on the employment probability of men than for women. The effect of strong activity limitations is stronger and higher in all countries examined compared to some activity limitations, and the sign of the gender gap varies across countries. Males have a lower reduction in employment probabilities than females in Spain, France and the UK, whereas the opposite is true in Italy (where the reductions in employment probabilities are -23.2% for males and -15.6% for females). In general, the negative effects of disability are reduced when the control variables are taken into account in Italy, Spain and France. In the UK, instead, the negative effect of disability increases, and there is no negligible increase in the magnitude of the APE for either gender, particularly for males, when complete models are estimated. (The negative effect of strong disability is approximately -33.1%.) Those effects, i.e., higher effects of disability and subsequently higher APE, may be due to the different distributions/behaviors of both initial conditions and neglected heterogeneity in the UK and due to the fact that the presence of unobservables may be more crucial here with respect to the other countries examined, particularly Italy (where the APE for strong activity limitations is lower than in the other countries). In addition, as explained above, males with strong activity limitations in the UK are more strongly penalized than women in terms of employment opportunities.

Past disability in the previous year also has a negative effect on current employment, even if it is lower than the effect of current disability (likely because of the integration of disabled people in the labour market). Again, males show a stronger disadvantage than females in terms of employment probability.

We now discuss the possible explanations for the negative direct effects of disability on employment across countries. There are a number of relevant factors, as explained in Section 2, that may negatively affect the employment probabilities of disabled individuals from both supply- and demand-side views. Labor supply may decrease because of the income effect related to the reception of disability benefits/allowances or because of the substitution effect deriving from higher opportunity costs of working associated with disability. The welfare systems are, however, different across the countries examined, and therefore, the magnitude of those possible contributing causes to direct effects of disability is mixed. Huys (2013), for instance, identifies four different welfare systems across Europe: The UK would be characterized by the

prevalence of direct payments, France would prevail with collectively organized assistance through private charities, and in Southern countries, e.g., Italy and Spain, direct payments and/or organized assistance are less widespread. In addition, empirical evidence shows that labor policies are sometimes not effective in promoting the employment of disabled people, particularly in Southern countries (e.g., Malo and Pagan 2014).

In addition, according to the job-search model, the higher mobility costs faced by disabled people may decrease their job-search intensity and thus reduce their employment perspectives. From a demand-side view, employers would be less likely to hire disabled people because disability is likely to be associated with lower productivity and extra costs for adjusting workplaces to disability requirements, i.e., prejudice and/or discrimination by employers towards disabled people. Our results suggest, therefore, the prevalence of supply- and demand-side negative factors.

Indirect Effects

The main messages that emerge from our estimation results suggest that indirect effects are more likely to affect females, that signs diverge across countries (negative in Italy and Spain and positive in France and UK) and, finally, that indirect effects more frequently act in the longer term. In particular, our results suggest that promoting early interventions that aim to anticipate the rise of negative effects of disability would be effective in preventing employment and therefore income losses at the household level in the long run. In addition, it should be noted that the magnitude of indirect effects diverges across countries (Table 5), and these effects are generally smaller than the direct effects of disability (Table 4).

Looking at males, we find evidence of a relevant negative effect for British males because of the current strong disability of other household member(s) and a negligible significant effect due to the past disability of other household member(s) for Spanish males. It seems particularly interesting to stress that indirect effects in the UK determine an asymmetric effect at the gender level; the employment probabilities of females increase in cases of the strong disability of other household member(s). Nonetheless, the negative effect on British males is limited to the short run. This suggests British males' rapid reaction to disability problems in their household; this would decrease their labor supply in the short term and then increase it in the medium

term. This explanation would be compatible with a dynamic British labor market, which would make easier the re-employment of those temporarily leaving the labor market to look after family members.

This finding is consistent with previous evidence that shows a greater negative effect on British males providing caring activities than on European males and British females (OECD 2011).

When focusing on females, a mixed country profile emerges and the indirect effects are volatile. The presence of strongly disabled household members reduces Italian females' current probability of being employed,[11] whereas Spanish females are subjected to a detrimental effect due to the longer term effects of household members' disability. These findings suggest, albeit with country differences, the prevalence of negative transmission mechanisms from disability to the employment of another household member in Italy and Spain. This is possibly due to the combination of household behavioral effects, assigning to females the role of providing care in the household, and is consistent with social norms that are still in force in Southern European countries. Furthermore, there are inadequate policies supporting the disabled, for example, through the public provision of care. In addition, although disability benefits are usually not particularly abundant and are relegated to individuals with strong disabilities, we cannot discard the hypothesis that a household income effect, related to the reception of monetary transfers, is at work in diminishing the female labor supply.

Conversely, French and British females are positively affected by the presence of long-run disability problems (respectively, strong disability and disability) in their household. Explanations for these findings include the need to increase the amount of income to meet the special/additional consumption requirements in presence of disabled members in the household. This support would be more robust if combined with positive effects derived from effective support policies for disabled individuals, releasing females from the provision of caring activities in their households. These policies would include provisions through special disability centers (public or private), accommodating disabled individuals during the working hours of relatives, and/or the provision of cheaper social services to look after disabled individuals at home.[12] In

[11] Although we do not find explicit evidence of indirect effects of disability affecting Italian females in the long run, it cannot be excluded that part of it has been intercepted by state dependence (see Gannon 2005).

[12] For example, the UK government provides support to disabled people who wish to stay in their home through the disabled facilities grant, home improvement agencies and local handyperson services.

addition, in Anglo-Saxon countries, i.e., the UK, governments implement programs to increase the supply of part-time job opportunities (to better reconcile work and family responsibilities) and private services, which have helped support women's work (Del Boca et al. 2005).

These explanations are possibly not exhaustive and possibly work in association with specific household behavior and social norms characterizing each country analyzed. Nevertheless, these findings highlight the existence of cross-country differences that would be, at least, partly explained by the interaction of different institutions and household behavior.

6. CONCLUSIONS

We study the direct and indirect effects of disability on employment, comparing four major Western European countries, i.e., Italy, Spain, France and the UK. Consistently with previous evidence, we find a negative direct effect of disability on employment probabilities. The effect is particularly strong in the UK, and its magnitude increases with the seriousness of the disability. We find evidence of a longer term effect of disability, particularly in the UK and Spain. Gender differences have also emerged.

Accounting for indirect effects of disability allows for examining from a different perspective the relationship between employment and disability, including the role of the household. At this stage, country and gender differences are particularly accentuated because of differences in institutions, policies and household behavior characterizing the analyzed countries. We find a significant and negative indirect effect on British males.

The effect is more mixed against females. In countries with a prevailing traditional family care system (Italy and Spain), the presence of disabled member(s) negatively affects the employment of females. In France and the UK, where different welfare systems are in force and social norms allow for a different allocation of caring activities, the net indirect effect on females is positive in the longer term. More generally, as a result of those different care and welfare systems, Italian and Spanish females still work less than women in France and the UK. As a results, the indirect effects of disability are more volatile for women than for men.

Our estimation results also show the existence of state dependence and endogenous initial conditions. In addition, empirical evidence is robust to reporting bias and endogeneity tests.

Finally, although we have tried to interpret our estimation results from a multi-faced perspective, it cannot be excluded that there might be other forces at work that could explain our findings. In addition, it should be stressed that we estimated the net direct/indirect effects of disability, and therefore, we cannot exclude that some underlying mechanisms affecting employment probabilities are contemporarily at work. However, an analysis that is able to single out the contribution of each specific factor goes beyond the purpose of this study, and it will be a part of future research.

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TABLES

Table 1: Employment Rates by Country and Gender, 2007-2010

	ITALY				SPAIN			
	Own		Other household member		Own		Other household member	
	Male	Female	Male	Female	Male	Female	Male	Female
No disability	84.45%	56.24%	84.12%	56.06%	84.33%	63.00%	82.97%	60.20%
Disability	71.44%	43.25%	73.56%	46.16%	61.69%	41.19%	73.26%	55.01%
Strong disability	40.87%	25.22%	69.10%	39.70%	42.60%	29.93%	66.41%	47.61%
	UK				FRANCE			
	Own		Other household member		Own		Other household member	
	Male	Female	Male	Female	Male	Female	Male	Female
No disability	90.33%	78.53%	85.07%	73.92%	84.32%	73.51%	81.63%	71.16%
Disability	68.97%	58.05%	83.33%	73.93%	62.80%	57.37%	70.55%	62.59%
Strong disability	25.81%	28.93%	64.75%	57.06%	43.23%	39.74%	68.03%	59.13%

Note: Employment rates computed on balanced samples
Source: our elaborations of EU SILC data

Table 2: Descriptive Statistics Rates by Country and Gender, 2007-2010

	ITALY		SPAIN		FRANCE		UK	
	Males	Females	Males	Females	Males	Females	Males	Females
Employment	0.814	0.534	0.797	0.583	0.796	0.695	0.838	0.729
Employment time 1	0.819	0.534	0.811	0.590	0.809	0.699	0.847	0.732
Disability								
No disability	0.859	0.830	0.831	0.804	0.830	0.811	0.839	0.819
Disability	0.102	0.133	0.129	0.158	0.114	0.135	0.089	0.115
Strong disability	0.038	0.037	0.040	0.038	0.055	0.055	0.072	0.065
Household member no disability	0.775	0.774	0.720	0.740	0.828	0.826	0.850	0.864
Household member disability	0.158	0.154	0.204	0.188	0.118	0.115	0.097	0.078
Household member strong disability	0.067	0.071	0.076	0.072	0.055	0.059	0.053	0.059
Disability benefits	0.060	0.040	0.040	0.027	0.040	0.035	0.063	0.047
Age								
Age [25,34]	0.180	0.183	0.196	0.185	0.161	0.171	0.140	0.149
Age [35,44]	0.290	0.314	0.285	0.295	0.293	0.283	0.281	0.301
Age [45,54]	0.317	0.280	0.305	0.300	0.288	0.294	0.293	0.276
Age [55,64]	0.214	0.222	0.214	0.219	0.259	0.252	0.286	0.274
Education								
None, elementary, or lower secondary	0.473	0.442	0.484	0.492	0.221	0.279	0.129	0.128
Upper secondary	0.350	0.357	0.236	0.203	0.501	0.411	0.417	0.442
Post secondary or tertiary	0.177	0.201	0.279	0.303	0.278	0.309	0.387	0.398
Married	0.672	0.718	0.694	0.689	0.634	0.622	0.670	0.632

Single	0.106	0.063	0.046	0.051	0.120	0.109	0.118	0.101
Number of kids 0-3	0.087	0.085	0.080	0.075	0.089	0.082	0.103	0.094
	0.297	*0.292*	*0.292*	*0.284*	*0.300*	*0.288*	*0.323*	*0.308*
Number of kids 4-15	0.473	0.489	0.544	0.542	0.653	0.651	0.600	0.624
	0.764	*0.768*	*0.813*	*0.811*	*0.958*	*0.945*	*0.936*	*0.933*
Local unemployment rate	7.283	7.437	13.273	13.247	8.312	8.351	5.593	5.532
	3.444	*3.494*	*5.848*	*5.872*	*2.474*	*2.531*	*1.475*	*1.478*
Equivalised Household Income	19.017	18.405	15.007	14.660	22.964	22.327	25.058	24.126
	12.371	*12.984*	*9.325*	*9.385*	*15.989*	*15.734*	*22.089*	*20.676*
Delta unemployment rate 2006-2007	-10.199	-10.256	-3.895	-3.974	-9.355	-9.410	2.812	2.730
	4.596	*4.538*	*7.874*	*7.473*	*8.237*	*8.125*	*12.915*	*12.949*
Observations	9000	9372	6896	7572	11172	12592	2600	3020

Notes: Standard deviations in parentheses for continuous variables.
The full specification also include control variables for lagged direct disability, lagged indirect/other household members' disability, and yearly time dummies. We did not report those information for the sake of brevity.
Source: our elaborations of EU SILC data

Table 3: APE for State Dependence Rates by Country and Gender, 2007-2010, balanced samples

	MALES		FEMALES	
ITALY	0.404	***	0.446	***
SPAIN	0.422	***	0.367	***
FRANCE	0.502	***	0.534	***
UK	*0.588*	***	0.390	***

* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.
Source: our elaborations of EU SILC data

Table 4: APE for Direct Effects of Disability by Country and Gender. 2007-2010.

Own disability - Direct effect

	ITALY			SPAIN			FRANCE			UK		
	Male	Female		Male	Female		Male	Female		Male	Female	
Disability	-0,006	-0,008		-0,078 ***	-0,075 ***		-0,022 ***	-0,016 *		-0,109 ***	-0,080 **	
Strong disability	-0,088 ***	-0,084 **		-0,141 ***	-0,098 **		-0,027 **	-0,051 ***		-0,266 ***	-0,224 ***	
Disability t-1	-0,009	-0,030 *		-0,035 **	-0,012		-0,016 **	-0,017 *		0,000	-0,053	
Strong disability t-1	-0,025	-0,048		-0,138 ***	-0,118 ***		-0,047 ***	-0,076 ***		-0,137 **	-0,174 ***	

* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Source: our elaborations of EU SILC data

Table 5: APE for Indirect Effects of Disability by Country and Gender. 2007-2010.

Other household member disability - Indirect effect

	ITALY		SPAIN		FRANCE		UK	
	Male	Female	Male	Female	Male	Female	Male	Female
Disability	-0,007	-0,017	-0,015	-0,009	-0,006	-0,013	0,017	0,006
Strong disability	-0,008	-0,046 *	0,002	-0,002	-0,007	0,023	-0,099 **	-0,024
Disability t-1	-0,008	-0,008	-0,001	-0,029 *	-0,007	0,010	0,032	0,070 *
Strong disability t-1	0,004	-0,009	0,002	-0,002	-0,007	0,023 *	0,028	0,005

* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Source: our elaborations of EU SILC data

Table 6: APE for Direct Effects of Disability and Disability Benefits by Country and Gender. 2007-2010.

Own disability - Direct effect

	ITALY		SPAIN		FRANCE		UK	
	Male	Female	Male	Female	Male	Female	Male	Female
Disability	-0,004	0,002	-0,060 ***	-0,064 ***	-0,019 ***	-0,010	-0,082 **	-0,076 ***
Disability*Benefit	-0,020	-0,184 ***	-0,164 ***	-0,090	-0,033	-0,104 ***	-0,300 **	-0,235 **
Strong disability	-0,057 ***	-0,055	-0,084 **	-0,072	-0,014	-0,041 ***	-0,191 ***	-0,159 ***
Strong disability*Benefit	-0,055	-0,205 **	-0,354 ***	-0,102	-0,042	-0,092 **	-0,147	-0,097
Disability t-1	-0,008	-0,027	-0,019	0,003	-0,008	-0,010	0,022	0,007
Disability t-1*Benefit	-0,004	0,046	-0,116 *	-0,206 **	-0,091 ***	-0,087 **	-0,076	-0,094
Strong disability t-1	-0,002	-0,036	-0,106 ***	-0,092 **	-0,034 ***	-0,066 ***	-0,068	-0,065 *
Strong disability t-1*Benefit	-0,043	0,007	-0,111	-0,180	-0,041	-0,062	-0,093	-0,089

* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Source: our elaborations of EU SILC data

Table 7: APE for Indirect Effects of Disability and Disability Benefits by Country and Gender. 2007-2010.

Other household member disability - Indirect effect

	ITALY		SPAIN		FRANCE		UK	
	Male	Female	Male	Female	Male	Female	Male	Female
Disability	-0,008	-0,026 *	-0,016	-0,004	-0,004	-0,016	0,015	0,002
Disability*Benefit	0,012	0,191 ***	0,052	-0,243 **	-0,069	0,086 *	0,096	0,057
Strong disability	-0,004	-0,051 *	-0,029	-0,017	0,004	-0,007	-0,120 **	-0,101 ***
Strong disability*Benefit	-0,093	0,093	-	-	0,015	0,053	0,089	0,034
Disability t-1	-0,008	-0,002	0,001	-0,030 *	-0,007	0,009	0,034	0,024
Disability t-1*Benefit	-0,004	-0,124	-0,108	0,141	0,012	0,042	0,019	-0,011
Strong disability t-1	0,002	-0,008	-0,003	-0,005	-0,007	0,023	0,036	0,017
Strong disability t-1*Benefit	0,011	-0,078	0,059	0,043	0,025	0,045	-0,378	-0,212

* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Source: our elaborations of EU SILC data

APPENDIX

Table A1: Average partial effects on probability of reporting activity limitations for dynamic random effects ordered probit by age group, unbalanced samples

Italy

	MEN						WOMEN					
	Age ≤ 45			Age > 45			Age ≤ 45			Age > 45		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.200	0.007	***	0.323	0.006	***	0.210	0.007	***	0.342	0.006	***
Education: Reference - Primary												
Medium education	-0.021	0.007	***	-0.043	0.009	***	-0.019	0.007	***	-0.056	0.011	***
High education	-0.031	0.009	***	-0.056	0.013	***	-0.020	0.009	**	-0.052	0.015	***
Quantile of the income distribution: Reference - 1st quantile												
qu2	-0.010	0.008		-0.011	0.011		-0.004	0.008		-0.034	0.013	***
qu3	0.007	0.008		-0.022	0.012	*	-0.003	0.009		-0.031	0.013	**
qu4	-0.014	0.009		-0.028	0.012	*	-0.007	0.009		-0.058	0.013	***

Spain

	MEN						WOMEN					
	Age ≤ 45			Age > 45			Age ≤ 45			Age > 45		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.229	0.009	***	0.329	0.009	***	0.222	0.009	***	0.344	0.008	***
Education: Reference - Primary												
Medium education	-0.018	0.011	*	-0.057	0.014	***	-0.021	0.011	***	-0.065	0.015	***
High education	-0.038	0.011	***	-0.083	0.015	***	-0.044	0.011	**	-0.085	0.016	***
Quantile of the income distribution: Reference - 1st quantile												
qu2	-0.015	0.012		0.003	0.014		0.019	0.011		-0.029	0.015	**
qu3	-0.030	0.012	**	-0.034	0.015	**	-0.006	0.012		-0.057	0.015	***
qu4	-0.028	0.013	**	-0.027	0.016	**	-0.003	0.014		-0.067	0.016	***

France

	MEN						WOMEN					
	Age ≤ 45			Age > 45			Age ≤ 45			Age > 45		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.231	0.009	***	0.370	0.006	***	0.236	0.017	***	0.377	0.006	***
Education: Reference - Primary												
Medium education	-0.025	0.010	*	-0.032	0.010	***	-0.029	0.010	***	-0.034	0.010	***
High education	-0.050	0.012	***	-0.044	0.014	***	-0.042	0.012	***	-0.046	0.014	***
Quantile of the income distribution: Reference - 1st quantile												
qu2	-0.017	0.010	*	-0.016	0.013		-0.008	0.010		-0.055	0.013	***
qu3	-0.027	0.011	*	-0.027	0.013	*	-0.031	0.011	***	-0.041	0.013	***
qu4	-0.047	0.013	***	-0.041	0.013	***	-0.025	0.013	**	-0.077	0.014	***

UK

	MEN						WOMEN					
	Age ≤ 45			Age > 45			Age ≤ 45			Age > 45		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.231	0.014	***	0.378	0.009	***	0.264	0.012	***	0.359	0.009	***
Education: Reference - Primary												
Medium education	0.000	0.017		-0.005	0.017		0.000	0.019		-0.031	0.017	**
High education	-0.013	0.018	*	-0.041	0.018	*	-0.038	0.021	*	-0.026	0.018	
Quantile of the income distribution: Reference - 1st quantile												
qu2	-0.011	0.015		-0.049	0.019	***	-0.025	0.016		-0.008	0.017	
qu3	-0.039	0.017	**	-0.039	0.019	**	-0.058	0.018	***	-0.076	0.019	***
qu4	-0.052	0.020	***	-0.048	0.020	**	-0.060	0.020	***	-0.126	0.022	***

* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.
Source: our elaborations of EU SILC data

Table A2: Average partial effects on probability of reporting activity limitations for dynamic random effects ordered probit by educational attainment, unbalanced samples

Italy

	MEN									WOMEN								
	Primary			Secondary			Tertiary			Primary			Secondary			Tertiary		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.315	0.006	***	0.214	0.008	***	0.191	0.011	***	0.329	0.007	***	0.227	0.008	***	0.213	0.011	***
Age	0.004	0.004		-0.003	0.003		-0.006	0.004		0.011	0.005	*	0.005	0.004		0.004	0.005	
Age square	0.000	0.000		0.000	0.000		0.000	0.000	*	0.000	0.000		0.000	0.000		0.000	0.000	
Quantile of the income distribution: Reference - 1st quantile																		
qu2	-0.009	0.011	*	-0.014	0.012		-0.025	0.019		-0.022	0.011	*	-0.014	0.012		-0.007	0.018	*
qu3	-0.007	0.011		-0.012	0.011	*	-0.001	0.016	*	-0.019	0.013	*	-0.018	0.012	*	-0.004	0.017	
qu4	-0.017	0.013		-0.025	0.011	*	-0.031	0.015	*	-0.044	0.015		-0.027	0.012	*	-0.024	0.016	

Spain

	MEN									WOMEN								
	Primary			Secondary			Tertiary			Primary			Secondary			Tertiary		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.326	0.009	***	0.255	0.013	***	0.203	0.012	***	0.339	0.009	***	0.236	0.015	***	0.211	0.011	***
Age	-0.003	0.005		-0.001	0.006		-0.001	0.005		0.005	0.005		0.013	0.007	*	0.001	0.004	
Age square	0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000	
Quantile of the income distribution: Reference - 1st quantile																		
qu2	-0.007	0.013		0.008	0.021		-0.023	0.019		-0.011	0.013		0.017	0.020		-0.010	0.019	*
qu3	-0.050	0.015	***	0.005	0.020		-0.041	0.018	*	-0.033	0.014	**	-0.030	0.021		-0.024	0.018	
qu4	-0.041	0.019	**	-0.007	0.020	*	-0.035	0.016	*	-0.067	0.020	***	-0.020	0.022	*	-0.024	0.016	

France

	MEN									WOMEN								
	Primary			Secondary			Tertiary			Primary			Secondary			Tertiary		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.389	0.009	***	0.302	0.008	***	0.238	0.011	***	0.399	0.008	***	0.299	0.008	***	0.243	0.010	***
Age	0.005	0.007		0.008	0.004	*	0.007	0.004		0.007	0.007		0.012	0.004	***	0.000	0.004	
Age square	0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000	**	0.000	0.000	
Quantile of the income distribution: Reference - 1st quantile																		
qu2	-0.038	0.018	*	-0.006	0.012		-0.016	0.018		-0.066	0.016	***	-0.023	0.012	**	0.005	0.018	
qu3	-0.059	0.020	***	-0.019	0.012		-0.015	0.016		-0.053	0.018	***	-0.025	0.013	**	-0.023	0.017	
qu4	-0.063	0.023	***	-0.055	0.014	***	-0.019	0.015		-0.078	0.022	***	-0.071	0.015	***	-0.022	0.016	*

UK

	MEN									WOMEN								
	Primary			Secondary			Tertiary			Primary			Secondary			Tertiary		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.400	0.016	***	0.333	0.012	***	0.262	0.014	***	0.406	0.015	***	0.337	0.011	***	0.255	0.013	***
Age	-0.002	0.015		0.000	0.006		0.006	0.007		-0.013	0.013	*	0.002	0.006		0.003	0.006	
Age square	0.000	0.000		0.000	0.000		0.000	0.000	*	0.000	0.000		0.000	0.000		0.000	0.000	
Quantile of the income distribution: Reference - 1st quantile																		
qu2	-0.059	0.036	*	-0.049	0.019	**	-0.014	0.022		-0.033	0.031	*	-0.012	0.018		0.009	0.020	
qu3	-0.001	0.038		-0.074	0.021	***	-0.012	0.020		-0.126	0.045	*	-0.082	0.020	***	-0.020	0.020	
qu4	-0.081	0.057		-0.061	0.024	***	-0.026	0.020	*	-0.219	0.073		-0.100	0.026	***	-0.051	0.020	*

* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.
Source: our elaborations of EU SILC data

Table A3: Average partial effects on probability of reporting activity limitations for dynamic random effects ordered probit by income quartile, unbalanced samples

Italy

Men

	1st quartile			2nd quartile			3rd quartile			4th quartile		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.280	0.009	***	0.260	0.009	***	0.268	0.009	***	0.219	0.009	***
Age	0.002	0.005	*	0.004	0.005		-0.003	0.004		-0.005	0.004	
Age square	0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000	*
Education: Reference - Primary												
Medium education	-0.019	0.013		-0.029	0.012	**	-0.032	0.011	***	-0.029	0.010	**
High education	-0.025	0.022		-0.052	0.020	**	-0.026	0.016	**	-0.045	0.012	**

Women

	1st quartile			2nd quartile			3rd quartile			4th quartile		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.288	0.009	***	0.275	0.009	***	0.268	0.009	***	0.240	0.010	***
Age	0.009	0.005	**	0.003	0.005		0.005	0.005		0.006	0.005	
Age square	0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000	

Education: Reference - Primary												
Medium education	-0.022	0.014	*	-0.029	0.013	*	-0.031	0.012	*	-0.030	0.012	**
High education	-0.024	0.021		-0.026	0.019		-0.018	0.015		-0.033	0.013	**

Spain

Men

	1st quartile			2nd quartile			3rd quartile			4th quartile		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.326	0.012	***	0.298	0.012	***	0.257	0.012	***	0.220	0.013	***
Age	-0.015	0.007	**	0.009	0.007		-0.006	0.006		0.002	0.005	
Age square	0.000	0.000	***	0.000	0.000		0.000	0.000	*	0.000	0.000	
Education: Reference - Primary												
Medium education	-0.061	0.022	***	-0.043	0.018	**	-0.004	0.015		-0.025	0.017	
High education	-0.044	0.024	**	-0.068	0.021	***	-0.044	0.016	***	-0.046	0.015	***

Women

	1st quartile			2nd quartile			3rd quartile			4th quartile		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.311	0.012	***	0.316	0.012	***	0.258	0.013	***	0.225	0.013	***
Age	0.012	0.007	**	0.006	0.006		-0.005	0.006		0.004	0.006	
Age square	0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000	
Education: Reference - Primary												
Medium education	-0.041	0.020	*	-0.024	0.018		-0.048	0.018	***	-0.017	0.019	*
High education	-0.051	0.024	*	-0.070	0.022	***	-0.059	0.017	***	-0.035	0.016	**

France

Men

	1st quartile			2nd quartile			3rd quartile			4th quartile		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.367	0.010	***	0.307	0.011	***	0.288	0.010	***	0.261	0.011	***
Age	0.012	0.007		0.005	0.006		0.010	0.005		0.004	0.005	
Age square	0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000	
Education: Reference - Primary												
Medium education	-0.050	0.015		-0.013	0.014		-0.010	0.015		-0.030	0.015	*
High education	-0.074	0.025		-0.056	0.022	*	-0.037	0.018	**	-0.024	0.015	

Women

	1st quartile			2nd quartile			3rd quartile			4th quartile		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.356	0.010	***	0.315	0.010	***	0.288	0.011	***	0.284	0.011	***
Age	0.007	0.006		0.003	0.006		0.011	0.005	*	0.006	0.005	
Age square	0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000	
Education: Reference - Primary												
Medium education	-0.043	0.014	***	-0.015	0.014		-0.016	0.014		-0.037	0.016	**
High education	-0.071	0.024	***	-0.016	0.020		-0.041	0.017	*	-0.027	0.015	**

UK

Men

	1st quartile			2nd quartile			3rd quartile			4th quartile		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.410	0.011	***	0.322	0.016	***	0.265	0.018	***	0.235	0.020	***
Age	-0.004	0.010		-0.002	0.007		0.007	0.009		0.014	0.010	
Age square	0.000	0.000		0.000	0.000		0.000	0.000		0.000	0.000	
Education: Reference - Primary												
Medium education	0.027	0.024		-0.017	0.023		-0.039	0.024		0.022	0.029	
High education	-0.040	0.029		-0.041	0.026		-0.041	0.024	**	0.003	0.028	**

Women

	1st quartile			2nd quartile			3rd quartile			4th quartile		
	APE	s.e.		APE	s.e.		APE	s.e.		APE	s.e.	
Lag Disability	0.402	0.011	***	0.366	0.014	***	0.264	0.016	***	0.184	0.019	***
Age	0.010	0.009		-0.013	0.008		0.000	0.008		-0.001	0.008	
Age square	0.000	0.000		0.000	0.000	*	0.000	0.000		0.000	0.000	
Education: Reference - Primary												
Medium education	-0.043	0.023	**	0.012	0.025	*	-0.010	0.027		0.020	0.031	**
High education	-0.099	0.031	***	-0.013	0.027		-0.004	0.027		0.012	0.030	**

* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.
Source: our elaborations of EU SILC data

Table A4. Endogeneity test: correlation between error terms of employment and disability equations

		Disability			OHM Disability		
		Parameter	s.e.		Parameter	s.e.	
ITALY	Male	-0.042	0.166		-0.184	0.126	
	Female	-0.265	0.203		-0.013	0.125	
SPAIN	Male	-0.418	0.233		0.043	0.191	
	Female	0.211	0.197		0.148	0.216	
FRANCE	Male	0.284	0.164		0.118	0.167	
	Female	-0.399	0.109	***	0.289	0.163	*
UK	Male	-0.156	0.318		0.199	0.285	
	Female	0.467	0.160	**	0.185	0.241	

* Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.
Source: our elaborations of EU SILC data