

**ANALYSING HEALTH LIMITATIONS IN SPAIN: AN EMPIRICAL  
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HOLD PANEL**

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# **ANALYSING HEALTH LIMITATIONS IN SPAIN: AN EMPIRICAL APPROACH BASED ON THE EUROPEAN COMMUNITY HOUSEHOLD PANEL (\*)**

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## **Abstract**

During the last years, policy makers have shown an increasing interest in social inclusion issues and reintegration policies for people with disabilities. However, disabled people are at a high risk of being unemployed. This paper is focused on labour market status of those individuals reporting “non-hampered in daily activities by a chronic or mental health problem, illness or disability”, using currently available data from large-scale representative surveys. In particular, we have used the information contained in the European Community Household Panel (ECHP).

*Key words:* Disability, labour market participation, ECHP.

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## 1. Introduction

Disabled people are a group at high risk of social exclusion and they are somewhat more likely to be unemployed and inactive than non-disabled people (Burchardt, 2000). The lack of adaptation of the working places together with the prejudice of employers are the main obstacles to employment and disability is seen as a consequence of social, attitudinal and environmental barriers that prevent people from participating in society (Gannon and Nolan, 2003). However, the lack of homogeneous and specific statistical information makes it difficult to evaluate to what extent the new protection policies are having a strong impact on the improvement of employment and quality of life of disabled people<sup>1</sup>.

Health status and other data related are usually obtained from the following sources: World Health Organization (WHO), National Health Surveys (NHS), Disability Surveys (DS), National Household Panel Surveys (such as the BHPS in United Kingdom, the ECPF in Spain, the SOEP in Germany), the European Community Household Panel<sup>2</sup> (ECHP), etc., but obviously it is not enough.

Undoubtedly, disability issues are linked with social exclusion. This fact implies the inability of individuals to participate in the social or economic political activities of the society in which live. By this way, social exclusion becomes a multidimensional concept that includes situations of poverty, relative privation, unemployment, lack of health care, illiteracy, etc. (Sen, 1992; Atkinson, 1998).

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<sup>1</sup> Disability impact on the cost of achieving a given level of welfare can be viewed through the theory of household production. Certain fixed inputs are required only by disabled people, other inputs are only required by the people with disabilities but at a level that varies with the basic commodities consumed and finally some goods cannot be used by disabled people. By constraining the input set, such restrictions may imply higher costs of achieving a given level of welfare. In this sense, Jones and O'Donnell (1995) identified the impact of disability on spending patterns over market goods and constructed equivalence scales.

<sup>2</sup> Also, it was included in the Labour Force Survey (LFS) in 2001, another wide harmonized population survey, a module on disability in relation to working conditions.

Nevertheless, discussion of the economics of disability requires a common understanding of the meaning of “disability” and an overview of both the extent and demographic and economic composition of the disabled population (Wolfe, 1984; Aarts and De Jong, 1992). So, we need a definition of disability that we will maintain throughout the paper. Any classification of disability is based on the notion of impairment. The WHO defines this as a “loss or abnormality of body structure or of a physiological or psychological function”. This impairment leads to limitation of activities, which can turn into restrictions in participation in society<sup>3</sup>.

Disability, is at the same time, an indicator of the severity of morbid states and an indicator of the quality of years lived. Although people with disabilities are a very heterogeneous group<sup>4</sup>, we will use the self-reported definition given in the European Community Household Panel (ECHP). The differences among countries are significant and the ECHP data suggest that Spain, Italy and Greece have relatively few people with disabilities (less than 10%) and the highest disability rates are found in Finland (23%) followed by the United Kingdom (European Commission, 2001).

Also, the impact of having a long-standing illness<sup>5</sup> on labour force participation limits the individual activities severely in their work or daily life (Loprest *et al.* 1995; Gruber, 2000; Ettner, 2000; Kidd *et al.*, 2000; De Leire, 2001; Gannon and Nolan, 2003; Lechner and Vazquez-Alvarez, 2004; Gannon, 2005). In this sense, across the European countries, there exists some evidence that disability income support policies have been used to hide unemployment rates and have been attractive to other workers (Haveman and Wolfe, 1999).

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<sup>3</sup> An impairment may not necessarily result in a disability and will depend upon the activities in which the individual in question intends to engage.

<sup>4</sup> Moreover, in most countries a significant proportion of people with disabilities report a combination of impairments.

<sup>5</sup> In many European countries, disability benefits exceed unemployment benefits and have a longer duration, leading to low employment rates among the disabled. Also, health care needs of disabled people tend to be covered by some form of universal health insurance.

However, disability affects the participation rate more than the unemployment rate. Consequently, the main labour market problem for people with disabilities is their low participation rate and low paid jobs. The low unemployment rate for people with disabilities may be partly explained by a “discouraged worker effect<sup>6</sup>”. The situation is likely to be reinforced by institutional factors and disincentives related to benefit systems (benefit traps) so, relatively low unemployment rates among disabled people do not fully capture the extent of their labour market disadvantage.

We have considered the implications of disability as problems of modern societies that should be approached from public sectors and for we need to know the socio-economic characteristics of individuals that cannot develop their daily activity due to some chronic illness, inability or deficiency. In this sense, failure to adjust to or to accommodate the needs of the disabled people can be viewed as a form of discrimination and also, obviously, in the participation or non-participation in the labour market.

The structure of the paper is the following one. The sources of information and variables included in the study are described in Section 2. In Section 3 we study those socio-demographic characteristics which could explain labour market participation in Spain. In Section 4, disability and potential wage discrimination is analysed. Finally, the conclusions of the paper are exposed in the Section 5.

## **2. Data Description: The European Community Household Panel (ECHP)**

The source of data used in this paper is taken from the European Community Household Panel (ECHP) for Spain. This survey contains data on individuals and households for the European Union countries with eight waves available (1994-2001). It is a longitudinal, multi-subject survey covering many aspects of daily life, particularly employment and income but also demographic characteristics, environment, education, health, household characteristics, and a variety of other topics.

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<sup>6</sup> Because chances of getting a job are perceived to be low, they do not enter into the labour market at all.

The three main features of the ECHP are: (i) simultaneous coverage of many aspects of daily life, (ii) a longitudinal or “panel” design and (iii) a standardized methodology producing comparable information for the Member States of the European Union. In this sense, it is important to highlight that it had never existed, for the whole European Union, a fixed and harmonized panel to study socio-economic characteristics of households and individuals of the whole European Union (Peracchi, 2002; Cantarero *et al.*, 2005).

It was elaborated for the first time in 1994 and it was composed by 60,500 households (approximately 170,000 individuals). In the case of Spain, the first wave was composed by 7,206 households (23,025 individuals). Table 1 includes detailed information about the sample of households and individuals of the ECHP for Spain and all the available waves.

**TABLE 1**  
Household’s sample composition in ECHP (1994-2001).  
Number of unweighted observations

Country:	<b>Wave 1</b>	<b>Wave 2</b>	<b>Wave 3</b>	<b>Wave 4</b>
Spain	<b>(1994)</b>	<b>(1995)</b>	<b>(1996)</b>	<b>(1997)</b>
Household	7206	6522	6267	5794
Individuals	23025	20708	19712	18167
	<b>Wave 5</b>	<b>Wave 6</b>	<b>Wave 7</b>	<b>Wave 8</b>
	<b>(1998)</b>	<b>(1999)</b>	<b>(2000)</b>	<b>(2001)</b>
Household	5485	5418	5132	4966
Individuals	16728	16222	15048	14320

Source: Authors’ calculation based on ECHP data.

In this paper, we have used the microdata for the European Union countries in order to test the sensitivity and robustness of the results to different hypotheses. The ECHP also contains questions on health and the respondent’s self-assessment on the limitation of activities (Pascual and Cantarero, 2007). In particular, given the nature of our study, we have used two questions to determine whether someone is disabled or not. The first one is “Do you have any chronic physical or mental health problem, illness or disability? (yes/no).

If yes, the second question is “Are you hampered in your daily activities by this chronic or mental health problem, illness or disability?” (no; yes, to some extent; yes, severely). In this way, those who answer “yes” (severely or to some extent) are defined as disabled persons. People reporting chronic illness or disability varies by age, gender and different socioeconomic factors. The interviews corresponding to the first eight waves of the ECHP were performed since 1994 to 2001. Table 2 reports frequencies for the response to the question “Are you hampered in daily activities by a chronic or mental health problem, illness or disability?” for each European Union country.

**TABLE 2**

Frequencies for the response to the question: “Are you hampered in daily activities by a chronic of mental health problem, illness or disability?”. **2001**

	<b>Denmark</b>	<b>Netherlands</b>	<b>Belgium</b>	<b>France</b>	<b>Ireland</b>	<b>Italy</b>	<b>Greece</b>
<b>Severely</b>	6.11	8.23	5.37	10.23	3.95	3.95	7.72
<b>To some extent</b>	16.53	15.90	9.48	13.34	12.35	6.16	8.61
<b>No</b>	77.36	75.87	85.15	76.43	83.70	89.74	83.68
	<b>Spain</b>	<b>Portugal</b>	<b>Austria</b>	<b>Finland</b>	<b>Sweden</b>	<b>Germany</b>	<b>U. Kingdom</b>
<b>Severely</b>	6.09	10.51	5.27	7.03	11.83	8.52	14.63
<b>To some extent</b>	10.15	13.53	11.69	19.41	13.14	28.47	--
<b>No</b>	83.76	75.96	83.04	73.56	75.03	63.01	85.37

SOURCE: Own elaboration from ECHP.

### **3. Disability and Labour Market Participation: An Empirical Analysis**

Participation in labour market has important effects on living standards and quality of life. However, the labour market status of those individuals hampered in daily activities by a health problem differ from the rest of the population.

In this paper, we use information from an existing dataset which is the ECHP, and obviously, the way disability is captured can be questioned. In fact, the ECHP is not designed to obtain only information about disability *per se* but it contains important



socio-demographic information about individuals and households in the European Union. Our key variable in the statistical model is a dichotomy variable which takes a value of 1 if the individual can be considered as disabled person, that is, if the individual is hampered severely or to some extent in his/her daily activities by a chronic or mental health problem, illness or disability. On the other hand, factors such as age, education, marital status, etc., and some economic data could be relevant in explaining whether an individual is hampered in his/her daily activities.

We will focus this analysis on the relationship between labour force participation and disability. In particular, we will use disability in the way that an individual is hampered in his/her daily activities by a chronic or mental health problem, illness or disability, as one of the reasons for which individuals are not working. Obviously, disability is related with population health.

Table 3 reports frequencies for the response to the question “Are you hampered in daily activities by a chronic or mental health problem, illness or disability?” considering individual’s Self-Assessed Health (SAH). SAH is a subjective response to the question “How is your health in general?” and it takes the values “1” (very good), “2” (good), “3” (fair), “4” (bad) and “5” (very bad). As can be noticed, those individuals who are not hampered in daily activities report better health.

**TABLE 3**

Self-Assessed Health in Spain by extent hampered in daily activities by a chronic or mental health problem, illness or disability. ECHP, 2001.

SAH	Hampered in daily activities		
	Severely (%)	To some extent (%)	No (%)
Very Good	0,69	0,58	5,11
Good	5,79	12,74	39,85
Fair	20,94	49,63	44,71
Bad	52,48	34,90	9,71
Very bad	20,11	2,15	0,62
TOTAL	100	100	100

SOURCE: Own elaboration from ECHP.

In order to classify individuals by labour market status, we distinguish three categories: in employment, unemployed or economically active. We will follow the traditional model of labour force participation (Kidd *et al.*, 2000). Thus, we assume an individual's participation decision is based upon a comparison of the offer wage with his or her reservation wage. The individual will participate if the offer wage exceeds the reservation wage. The reservation wage is defined as the wage at which the individual is indifferent between working and not working. Although the reservation wage is not directly observable, we do observe the outcome of the individual's labour force participation decision. Thus, we can define a dummy variable representing whether ( $Y=1$ ) or not ( $Y=0$ ) an individual is employed. A set of factors, such as age, marital status, education, etc., gathered in a vector  $x$  explain this fact so the probability model is a regression:

$$E(y | x) = F(x, \beta)$$

The set of parameters  $\beta$  reflects the impact of changes in  $x$  on the probability. In order to estimate this equation, a nonlinear specification of  $F(\cdot)$  can avoid logical inconsistency and the possibility of predicted probabilities outside the range  $[0,1]$ . The most common nonlinear parametric specifications are logit and probit models which have been analysed. So, we are going to use a latent variable interpretation (Jones, 2000; Greene, 2003). Let

$$\begin{aligned} y &= 1 & \text{if } y_i^* > 0 \\ y &= 0 & \text{if } y_i^* \leq 0 \end{aligned}$$

where

$$y^* = x' \beta + \varepsilon .$$

If we assume that  $\varepsilon$  has a standard normal distribution, we obtain the probit model, while assuming a standard logistic distribution, we obtain the logit model. These models are usually estimated by maximum likelihood.

Given the structure of our database, the aim of this paper is to model the labour market participation as a function of a range of socio-economic characteristics. In order to establish the main factors which affect labour participation, we have classified them into four groups of variables: personal characteristics, education level, marital status and health status. Table 4 shows explanatory variables used in estimations and their corresponding definitions.

**TABLE 4**  
Variables Definitions

<b>Variable Name</b>	<b>Variable Definition</b>
<b>Personal Characteristics</b>	
Gender (MALE)	1 if male, 0 otherwise
Age (AGE)	Age in years at 31 <sup>st</sup> December of current wave
Age squared (AGE2)	Age <sup>2</sup>
<b>Education Level</b>	
Higher Education (HEDUC)	1 if highest academic qualification is third level (ISCED 5-7), 0 otherwise
First Stage Education (FSEDUC)	1 if highest academic qualification is first stage of primary level (ISCED 0-2), 0 otherwise
<b>Marital status</b>	
Never Married (NVRMAR)	1 if never married, 0 otherwise
Separated (SEPARATED)	1 if separated, 0 otherwise
Divorced (DIVORCED)	1 if divorced, 0 otherwise
Widow (WIDOW)	1 if widowed, 0 otherwise
<b>Health Status</b>	
Hampered in daily activities (HAMPERED)	1 if individual is hampered in daily activities by a chronic or mental health problem, illness or disability, 0 otherwise

Source: Authors' elaboration from ECHP.

Firstly, as personal characteristics we have included two variables: individual's age and gender. To allow for a flexible relationship between labour status and age, a quadratic polynomial function of this variable is included (AGE; AGE2=Age<sup>2</sup>). Also, the gender of individuals has been taken into consideration and a dummy variable, which takes value of 1 if individual is male, has been built.

The second group of variables are referred to the maximum level of education completed. In the ECHP, education is classified into three categories based on ISCED classification: less than secondary level (ISCED 0-2), second stage of secondary level (ISCED 3) and third level (ISCED 5-7). Thus, two dummy variables have been included: third level of education (HEDUC) and another one for less than secondary level (FSEDUC). In this sense, many studies have shown that education is an important socioeconomic characteristic in determining health status (and labour participation), so the attainment of higher educational levels can be reflecting important changes in unemployment rates.

Thirdly, representing marital status, we have considered four variables (never married, separated, divorced and widow) with married as the reference category. Finally, we have considered if individual is hampered in daily activities.

Table 5 reports the results of the estimation from 1998 to 2001 (similar results have been obtained with the other waves) and two types of explanatory variables have been included.

The first type can be treated as though they were continuous variables (individual's age measured in years) and other explanatory variables are binary or dummy variables. These take the value 1 if the individual has a particular characteristic and 0 otherwise. In this way, the marginal effects let us know the impact of a small change in the variable on the probability of participation in the labour market. Thus, we can study the impact of age on the probability of being working.

On the other hand, for the dummy variables, it does not make sense to think in terms of small changes (an individual either has a characteristic or does not). So, we will consider the average effects, that is, the difference in the probability of being unemployed if someone is hampered in daily activities compared to someone who is not hampered.

Finally, the sign of the coefficients inform us about the qualitative effect of the explanatory variables. In this way, if the sign of the coefficient on MALE is positive, this means that male are more likely to be working relative to the reference individual who is female.

Our estimates show that most of the coefficients are significant and have the expected signs. For example, MALE has a positive coefficient. Also, those with less education (and fewer years of education) are more likely to be unemployed. The education coefficients maintain statistical significance showing that more education leads to an increase in the probability of being working. In addition, health status is an important determinant of employment.

**TABLE 5**  
Probit Estimates including average and marginal effects

1998							1999						
	Coef.	Std. Err.	z	P>z	dF/dx	Std. Err.		Coef.	Std. Err.	z	P>z	dF/dx	Std. Err.
MALE	0,9502	0,0271	35,07	0,0000	0,2933	0,0085	MALE	1,0049	0,0284	35,36	0,0000	0,3078	0,0090
AGE	0,2442	0,0066	37,09	0,0000	0,0760	0,0017	AGE	0,2561	0,0069	37,10	0,0000	0,0790	0,0018
AGE <sup>2</sup>	-0,0030	0,0001	-40,38	0,0000	-0,0009	0,0000	AGE <sup>2</sup>	-0,0032	0,0001	-40,21	0,0000	-0,0010	0,0000
FSEDUC	-0,4581	0,0529	-8,66	0,0000	-0,1258	0,0126	FSEDUC	-0,5518	0,0572	-9,65	0,0000	-0,1457	0,0125
HEDUC	0,4899	0,0394	12,43	0,0000	0,1697	0,0149	HEDUC	0,5890	0,0410	14,35	0,0000	0,2058	0,0158
NVRMAR	-0,0521	0,0388	-1,34	0,1790	-0,0161	0,0119	NVRMAR	-0,0053	0,0398	-0,13	0,8950	-0,0016	0,0123
SEPARATED	-0,0455	0,0973	-0,47	0,6400	-0,0139	0,0293	SEPARATED	0,2316	0,1045	2,22	0,0270	0,0769	0,0370
DIVORCED	0,2165	0,1323	1,64	0,1020	0,0721	0,0468	DIVORCED	0,3143	0,1399	2,25	0,0250	0,1068	0,0514
WIDOW	0,1370	0,0877	1,56	0,1180	0,0443	0,0294	WIDOW	-0,0086	0,0963	-0,09	0,9290	-0,0026	0,0296
HAMPERED	-1,0542	0,0891	-11,83	0,0000	-0,2155	0,0099	HAMPERED	-1,0964	0,0940	-11,66	0,0000	-0,2161	0,0099
Number of obs.	13779						Number of obs.	13104					
Pseudo R2	0,3411						Pseudo R2	0,3697					
Log likelihood	-6127,7093						Log likelihood	-5611,0567					
2000							2001						
	Coef.	Std. Err.	z	P>z	dF/dx	Std. Err.		Coef.	Std. Err.	z	P>z	dF/dx	Std. Err.
MALE	1,0030	0,0294	34,15	0,0000	0,3135	0,0094	MALE	0,9751	0,0302	32,27	0,0000	0,3018	0,0096
AGE	0,2518	0,0070	35,88	0,0000	0,0795	0,0018	AGE	0,2684	0,0073	36,90	0,0000	0,0837	0,0019
AGE <sup>2</sup>	-0,0031	0,0001	-39,08	0,0000	-0,0010	0,0000	AGE <sup>2</sup>	-0,0033	0,0001	-40,01	0,0000	-0,0010	0,0000
FSEDUC	-0,5103	0,0590	-8,65	0,0000	-0,1404	0,0137	FSEDUC	-0,4994	0,0642	-7,78	0,0000	-0,1352	0,0147
HEDUC	0,4529	0,0407	11,13	0,0000	0,1572	0,0154	HEDUC	0,5538	0,0418	13,25	0,0000	0,1933	0,0160
NVRMAR	0,0356	0,0408	0,87	0,3840	0,0113	0,0130	NVRMAR	0,0732	0,0418	1,75	0,0800	0,0230	0,0132
SEPARATED	0,2970	0,1070	2,78	0,0060	0,1022	0,0395	SEPARATED	0,2571	0,1136	2,26	0,0240	0,0867	0,0409
DIVORCED	0,2664	0,1400	1,90	0,0570	0,0910	0,0511	DIVORCED	0,2080	0,1364	1,52	0,1270	0,0692	0,0481
WIDOW	0,0390	0,0936	0,42	0,6770	0,0124	0,0302	WIDOW	0,1092	0,0970	1,13	0,2600	0,0351	0,0322
HAMPERED	-1,5217	0,1072	-14,20	0,0000	-0,2585	0,0079	HAMPERED	-1,5129	0,1068	-14,16	0,0000	-0,2540	0,0082
Number of obs.	12317						Number of obs.	11964					
Pseudo R2	0,3756						Pseudo R2	0,3922					
Log likelihood	-5260,0061						Log likelihood	-4988,5917					

(\*) dF/dx is for discrete change of dummy variable from 0 to 1.  
z and P>|z| are the test of the underlying coefficient being 0.  
SOURCE: Own elaboration from ECHP.

Finally, it is important to note that the model account for about 20% of the variation of the transition probabilities, based on the values of the pseudo-R squared statistics. As well, we have to point out that the average effect of being hampered is around  $-0,20$  (for each wave). Thus, we can conclude that in Spain there exists an important relationship between being unemployed and reporting hampered in daily activities by a chronic or mental health problem, illness of disability.

#### **4. Disability and Potential Wage Discrimination**

In the previous section, we have shown that people who are hampered in daily activities have a lower labour market participation rate but we need to analyse “why” in order to establish adequate public policies. Obviously, disabled people have health problems which can limit their productivity for some types of work (see Blinder, 1973; Baldwin and Johnson, 1994) and lead to the existence of wage discrimination.

Thus, we will test the existence of a gap in wages between disabled and non-disabled workers. Since the seminal paper of Mincer in 1958, many authors have studied the relationship between human capital investment and earnings. Also, it is important to point out the implications of health capital theory stated firstly by Grossman (1972) and followed by several other papers.

However, very few have included health as explanatory factor of earnings differences (Contoyannis and Rice, 2001; Gambin, 2003). In this sense, most of the recent research has been focused on gender discrimination.

We empirically study if lower earnings are significantly associated with disability. We will focus on the traditional proposed by Mincer (1974):

$$\ln[w(s, x)] = \beta_0 + \beta_1 s + \beta_2 x + \beta_3 x^2 + \varepsilon,$$

where  $w$  is hourly wage,  $s$  is the level of schooling,  $x$  is work experience and  $\varepsilon$  is an error term. Thus, coefficients on explanatory variables represent the returns to schooling and work experience, respectively.

We will expand Mincer model to include other variables such as age, gender, health variables, marital status, etc. As a result, the basic framework is a regression model of the form:

$$\ln(w_{it}) = \alpha_i + \beta X_{it} + \varepsilon_{it},$$

where  $i$  refers to the individual,  $t$  is the year ( $t=1994, \dots, 2001$ ) and  $X$  denotes a vector of explanatory variables.

For the econometric estimation, the standard panel technique was used (see Jones, 2000; Greene, 2003) and the fundamental advantage of this panel data set over a cross section is that it allows us great flexibility in modelling differences across individuals. Our sample includes employed adults aged 23 to 64 years (dropping observations with missing information which is necessary for the analysis) and panel data techniques based on Mincer wage functions have been used.

The sample has been partitioned by health status. Definitions of variables included in the analysis are shown in Table 4 (we have included also the occupational status defined as Sector of current job (PUBLIC) in 1 if individual works in public sector, 0 otherwise) and the results of the estimation are given in Table 6.

The dependent variable is the natural logarithm of hourly wage. However, since the ECHP does not include this information, we have calculated it from the monthly wages and total work hours per week.



Also, we have used Hausman's specification test for the random effects model. This specification, which was devised by Hausman (1978), is used to test orthogonality of the random effects and the regressors<sup>7</sup>. Finally, a Wald test is included to evaluate the joint significance of the variables.

First of all, we test the significance of the group effects with an  $F$ -test. In our model we reject the hypothesis that the individual effects are the same. Secondly, we can use the fixed-effects approach or the random-effects approach. The Hausman test value shows that the first one should be used when the dependent variable is log-hourly earnings.

The results obtained show that the relationships between socio-demographic characteristics and earnings are as expected. Thus, hourly wages are greater for men than for women, higher levels of education lead to greater earnings, working in the public sector has a positive effect on the log of hourly wages.

On the other hand, the relationship between marital status and earnings is not so clear. However, it is important to point out that the coefficient on HAMPERED is negative but not statistically significant.

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<sup>7</sup> Hausman's essential result is that the covariance of an efficient estimator with its difference from an inefficient estimator is zero.

**TABLE 6**  
Results Panel Data approach.  
Dependent variable: Natural logarithm of hourly wage

Variables	Random Effects	Fixed Effects
<b>MALE</b>	0,1333	
Std. Error	(0,0093)	
T Statistic	14,24	
P-value	0,0000	
<b>AGE</b>	0,0706	0,0952
Std. Error	(0,0025)	(0,0032)
T Statistic	28,00	29,33
P-value	0,0000	0,0000
<b>AGE<sup>2</sup></b>	-0,0006	-0,0004
Std. Error	(0,0003)	(0,0000)
T Statistic	-20,85	-11,67
P-value	0,0000	0,0000
<b>HEDUC</b>	0,3577	0,0259
Std. Error	(0,0092)	(0,0142)
T Statistic	38,90	1,82
P-value	0,0000	0,0680
<b>NVRMAR</b>	-0,0243	-0,0425
Std. Error	(0,0082)	(0,0104)
T Statistic	-2,95	-4,08
P-value	0,0030	0,0000
<b>SEPARATED</b>	-0,0141	0,0232
Std. Error	(0,0167)	(0,0186)
T Statistic	-0,85	1,24
P-value	0,3970	0,2130
<b>DIVORCED</b>	0,0004	-0,0055
Std. Error	(0,0231)	(0,0263)
T Statistic	0,02	-0,21
P-value	0,9850	0,8340
<b>WIDOW</b>	-0,1263	-0,0592
Std. Error	(0,0277)	(0,0380)
T Statistic	-4,56	-1,56
P-value	0,0000	0,1190
<b>PUBLIC</b>	0,0808	0,0033
Std. Error	(0,0071)	(0,0082)
T Statistic	11,32	0,40
P-value	0,0000	0,6870
<b>HAMPERED</b>	-0,0152	-0,0224
Std. Error	(0,0194)	(0,0189)
T Statistic	-0,78	-1,19
P-value	0,4330	0,2350
R-square	0,2619	0,2376
Wald Statistic and Prob(Wald)	5477,37 (0,0000)	
Hausman Statistic and Prob(Hausman)	5711,39 (0,0000)	
F Statistic and Prob(F)		840,23 (0,0000)
Number of observations	33186	

Source: Authors' calculations from ECHP

Thus, these results cannot confirm us the existence of wage discrimination. So we need to deep in this analysis. In fact, wage differential could be due to differences in “objectives” characteristics such as education or work experience.

Discrimination against disabled people can be said to exist whenever the relative wage of non-disable people exceeds the relative wage that would be prevailed if disable and non-disable people were paid according to the same criteria. A simple way to study these differences is to estimate a regression like:

$$\ln(W_i) = \beta_0 + \sum_{j=1}^n \beta_j X_j + \varepsilon_i ,$$

where  $\ln(W_i)$  is the level of natural logarithm of earnings (hourly wage) and  $X_j$  are  $n$  observable characteristics used to explain  $W$ .

However, we are interested in comparing two different groups (Hampered and Non-Hampered, respectively), so we will estimate for each group the following equation:

$$W_i^H = \beta_0^H + \sum_{j=1}^n \beta_j^H X_j^H + \varepsilon_i^H$$

$$W_i^{NH} = \beta_0^{NH} + \sum_{j=1}^n \beta_j^{NH} X_j^{NH} + \varepsilon_i^{NH}$$

where  $H$  denotes the hampered-group and  $NH$  indicates the non-hampered group.

Therefore, population has been divided into two groups. Following the model proposed by Oaxaca (1973) and Oaxaca and Ransom<sup>8</sup> (1994), we can calculate the portion of differential explained by the regression:  $\sum \beta_j^{NH} X_j^{NH} - \sum \beta_j^H X_j^H$  and the differential which is captured by the shift coefficient  $\beta_0^{NH} - \beta_0^H$ .

In fact, we can consider not only differences in the coefficients  $\beta_j^{NH}$  and  $\beta_j^H$  but also differences in the average characteristics. Thus, the portion of the differential attributable to discrimination can be measured as:

$$D = (\beta_0^{NH} - \beta_0^H) + \sum \bar{X}_j^{NH} (\beta_j^{NH} - \beta_j^H).$$

In the empirical analysis we will use explanatory variables defined in Table 4. Thus, we have included personal characteristics (individual's age and gender), level of education completed, marital status (never married, separated, divorced and widow), working or not in public sector.

Results from estimating wage equations for disabled and non-disabled people are shown in Table 7.

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<sup>8</sup> Véase recientes aplicaciones en, entre otros, Deutsch y Silber (2007) y Lin (2007).

**TABLE 7**  
Structural coefficients. Dependent variable: Natural log of wage (hourly).

<b>1998</b>												
	Full Sample				Hampered				Non-Hampered			
	Coef.	Std. Err.	z	P>z	Coef.	Std. Err.	z	P>z	Coef.	Std. Err.	z	P>z
AGE	0,0491	0,0054	9,09	0,0000	0,0439	0,0222	1,98	0,0490	0,0494	0,0056	8,81	0,0000
AGE <sup>2</sup>	-0,0005	0,0001	-7,30	0,0000	-0,0004	0,0003	-1,66	0,0980	-0,0005	0,0001	-7,03	0,0000
MALE	0,1783	0,0138	12,93	0,0000	0,2162	0,0618	3,50	0,0010	0,1756	0,0142	12,41	0,0000
NVRMAR	-0,1041	0,0169	-6,16	0,0000	-0,0516	0,0782	-0,66	0,5100	-0,1063	0,0173	-6,14	0,0000
SEPARATED	-0,2084	0,0425	-4,91	0,0000	-0,3348	0,2206	-1,52	0,1310	-0,2044	0,0433	-4,72	0,0000
DIVORCED	0,0313	0,0557	0,56	0,5750	0,5954	0,2528	2,36	0,0190	-0,0005	0,0571	-0,01	0,9920
WIDOW	-0,0646	0,0575	-1,12	0,2610	-0,1159	0,2223	-0,52	0,6030	-0,0594	0,0596	-1,00	0,3200
HEDUC	0,4965	0,0166	29,87	0,0000	0,6053	0,1243	4,87	0,0000	0,4944	0,0167	29,52	0,0000
PUBLIC	0,1836	0,0162	11,31	0,0000	0,2837	0,0831	3,41	0,0010	0,1785	0,0166	10,78	0,0000
HAMPERED	-0,1467	0,0290	-5,06	0,0000								
CONSTANT	0,3149	0,1097	2,87	0,0040	0,2262	0,4767	0,47	0,6360	0,3108	0,1134	2,74	0,0060
$R^2$	0,3466				$R^2$ 0,2935				$R^2$ 0,3461			
<b>1999</b>												
	Full Sample				Hampered				Non-Hampered			
	Coef.	Std. Err.	z	P>z	Coef.	Std. Err.	z	P>z	Coef.	Std. Err.	z	P>z
AGE	0,0450	0,0054	8,36	0,0000	0,0264	0,0278	0,95	0,3440	0,0463	0,0055	8,38	0,0000
AGE <sup>2</sup>	-0,0004	0,0001	-6,67	0,0000	-0,0002	0,0003	-0,52	0,6030	-0,0004	0,0001	-6,74	0,0000
MALE	0,1598	0,0134	11,96	0,0000	0,1048	0,0735	1,43	0,1560	0,1615	0,0136	11,88	0,0000
NVRMAR	-0,0902	0,0163	-5,54	0,0000	0,0511	0,0946	0,54	0,5900	-0,0946	0,0165	-5,72	0,0000
SEPARATED	-0,1767	0,0401	-4,41	0,0000	-0,1851	0,1597	-1,16	0,2480	-0,1722	0,0416	-4,14	0,0000
DIVORCED	-0,0944	0,0511	-1,85	0,0650	-0,0105	0,3186	-0,03	0,9740	-0,0945	0,0519	-1,82	0,0680
WIDOW	-0,0888	0,0594	-1,49	0,1350	-0,1420	0,1906	-0,74	0,4570	-0,1015	0,0637	-1,59	0,1110
HEDUC	0,4666	0,0160	29,23	0,0000	0,2976	0,1269	2,35	0,0200	0,4708	0,0161	29,25	0,0000
PUBLIC	0,1953	0,0158	12,32	0,0000	0,3413	0,0856	3,99	0,0000	0,1907	0,0161	11,81	0,0000
HAMPERED	-0,1771	0,0315	-5,62	0,0000								
CONSTANT	0,4866	0,1090	4,46	0,0000	0,5690	0,6065	0,94	0,3500	0,4641	0,1116	4,16	0,0000
$R^2$	0,3446				$R^2$ 0,2468				$R^2$ 0,3436			

SOURCE: Own elaboration from ECHP.

**TABLE 7 (continue)**  
Structural coefficients. Dependent variable: Natural log of wage (hourly).

<b>2000</b>												
	Full Sample				Hampered				Non-Hampered			
	Coef.	Std. Err.	z	P>z	Coef.	Std. Err.	z	P>z	Coef.	Std. Err.	z	P>z
AGE	0,0429	0,0055	7,81	0,0000	0,0339	0,0278	1,22	0,2250	0,0417	0,0056	7,42	0,0000
AGE <sup>2</sup>	-0,0004	0,0001	-6,15	0,0000	-0,0004	0,0003	-1,29	0,2010	-0,0004	0,0001	-5,70	0,0000
MALE	0,1973	0,0134	14,68	0,0000	0,1460	0,0722	2,02	0,0450	0,2000	0,0137	14,63	0,0000
NVRMAR	-0,0812	0,0164	-4,95	0,0000	-0,0688	0,1013	-0,68	0,4980	-0,0808	0,0166	-4,86	0,0000
SEPARATED	-0,1399	0,0397	-3,52	0,0000	-0,3288	0,1936	-1,70	0,0920	-0,1300	0,0406	-3,20	0,0010
DIVORCED	0,0431	0,0516	0,84	0,4030	0,1340	0,1946	0,69	0,4920	0,0274	0,0537	0,51	0,6090
WIDOW	-0,0370	0,0589	-0,63	0,5300	0,0176	0,2181	0,08	0,9360	-0,0384	0,0613	-0,63	0,5310
HEDUC	0,4718	0,0158	29,77	0,0000	0,6032	0,1394	4,33	0,0000	0,4709	0,0159	29,56	0,0000
PUBLIC	0,1580	0,0162	9,78	0,0000	0,2067	0,1151	1,80	0,0750	0,1539	0,0163	9,44	0,0000
HAMPERED	-0,1413	0,0321	-4,40	0,0000								
CONSTANT	0,5460	0,1114	4,90	0,0000	0,8159	0,5872	1,39	0,1670	0,5586	0,1137	4,91	0,0000
R <sup>2</sup>	0,3355				R <sup>2</sup> 0,2888				R <sup>2</sup> 0,3369			
<b>2001</b>												
	Full Sample				Hampered				Non-Hampered			
	Coef.	Std. Err.	z	P>z	Coef.	Std. Err.	z	P>z	Coef.	Std. Err.	z	P>z
AGE	0,0446	0,0056	8,00	0,0000	-0,0277	0,0341	-0,81	0,4190	0,0467	0,0057	8,23	0,0000
AGE <sup>2</sup>	-0,0004	0,0001	-6,34	0,0000	0,0003	0,0004	0,82	0,4120	-0,0004	0,0001	-6,53	0,0000
MALE	0,2145	0,0133	16,12	0,0000	0,2971	0,0838	3,54	0,0010	0,2112	0,0134	15,70	0,0000
NVRMAR	-0,0564	0,0162	-3,49	0,0000	-0,1583	0,1041	-1,52	0,1310	-0,0527	0,0163	-3,23	0,0010
SEPARATED	-0,0576	0,0421	-1,37	0,1720	0,1146	0,1988	0,58	0,5650	-0,0667	0,0432	-1,54	0,1230
DIVORCED	0,0090	0,0547	0,16	0,8690	-0,0364	0,2185	-0,17	0,8680	0,0156	0,0569	0,27	0,7840
WIDOW	-0,1076	0,0556	-1,94	0,0530	-0,2522	0,2567	-0,98	0,3280	-0,0965	0,0573	-1,69	0,0920
HEDUC	0,4499	0,0157	28,60	0,0000	0,5022	0,1496	3,36	0,0010	0,4473	0,0158	28,39	0,0000
PUBLIC	0,1895	0,0164	11,54	0,0000	0,2323	0,1261	1,84	0,0680	0,1887	0,0165	11,43	0,0000
HAMPERED	-0,1861	0,0337	-5,52	0,0000								
CONSTANT	0,5224	0,1122	4,66	0,0000	0,1957	0,7301	2,68	0,0080	0,4773	0,1140	4,19	0,0000
R <sup>2</sup>	0,3436				R <sup>2</sup> 0,2468				R <sup>2</sup> 0,3446			

Source: Authors' calculations from ECHP

As can be noticed there exist some differences in the coefficients obtained specially in the sex and education variables which could explain the existence of discrimination. So, we are going to formalize this result using the measure of discrimination defined by Oaxaca (1973):

$$D = \frac{W_{NH} / W_H - (W_{NH} / W_H)^0}{(W_{NH} / W_H)^0}$$

where:

$(W_{NH} / W_H)$  denotes the observed non-hampered / hampered wage ratio, and

$(W_{NH} / W_H)^0$  is the non-hampered / hampered wage ratio in the absence of discrimination.

Taking natural logarithms, it is obtained:

$$\ln(D + 1) = \ln(W_{NH} / W_H) - \ln(W_{NH} / W_H)^0.$$

On the other hand, we can define  $G$  as:

$$G = \frac{\bar{W}_{NH} - \bar{W}_H}{\bar{W}_H}.$$

Then:

$$\ln(G + 1) = \ln(\bar{W}_{NH}) - \ln(\bar{W}_H).$$

By ordinary least squares estimation, we obtain:

$$\ln(G + 1) = \hat{\beta}_{NH} \bar{X}_{NH} - \hat{\beta}_H \bar{X}_H.$$

Let:

$$\Delta \bar{X} = \bar{X}_{NH} - \bar{X}_H$$

$$\Delta \hat{\beta} = \hat{\beta}_H - \hat{\beta}_{NH}$$

Then, the non-disable / disable wage differential can be expressed as:

$$\ln(G + 1) = \hat{\beta}_H \Delta \bar{X} - \Delta \hat{\beta} \bar{X}_{NH}.$$

Thus, we can decompose wage differential into the estimated effects of differences in individual characteristics and the estimation effects of discrimination, respectively (see Table 8).

The average logarithms of the hourly wages in 1998 obtained from our sample are 1,6029 euros for hampered individuals and 1,7770 for non-disabled. Thus, the value of wage differential in logarithmic terms,  $\ln(G+1)$ , is 0,1742. So the value of  $G$  is 0,1903. As can be noticed, in 1998, the average estimate of the discrimination is 36,78% although the most significant differences are due to sex differences.

**TABLE 8**  
Effects of Discrimination Estimated from wage regressions. Year: 1998.

Item	Hamper Regression Weights		Non Hamper Regression Weights	
	$\hat{\beta}_H \Delta \bar{X}$	% of the wage differential	$\hat{\beta}_{NH} \Delta \bar{X}$	% of the wage differential
<b>Wage Differential</b>	<b>0,1742</b>	<b>100%</b>	<b>0,1742</b>	<b>100%</b>
MALE	0,0989	56,77	0,0873	50,09
NVRMAR	-0,0100	-5,75	-0,0253	-14,53
SEPARATED	-0,0070	-4,00	-0,0045	-2,57
DIVORCED	0,0068	3,88	0,0000	0,00
WIDOW	-0,0065	-3,72	-0,0013	-0,77
HEDUC	0,0218	12,50	0,0855	49,05
PUBLIC	0,0107	6,17	0,0211	12,11
	$\ln(D+1)=0,2889$ $D=0,3350$	65,85%	$\ln(D+1)=0,3369$ $D=0,4006$	93.38%

Source: Authors' calculations from ECHP



## 5. Conclusions

In this paper we have found evidence which could help us to understand the importance of establishing adequate public policies to increase labour market participation of those individuals who can be classified as “disabled people”. It is important to identify individuals at high risk of social exclusion in order to promote participation in the labour market and facilitate access to resources, rights, goods and services for all. In this sense, using the data contained in the ECHP, disabled people have been defined as those individuals who are hampered in daily activities by a chronic or mental health problem, illness or disability.

The results of our analysis bring out the negative effect of being female and being hampered on the probability of being working. Thus, we can confirm the existence of labour market participation differences between the able-bodied and the disabled people in Spain. This is similar to European Union countries where the low unemployment rate for people with disabilities may be partly explained by a ‘discouraged worker effect’: because chances of getting a job are perceived to be low, they do not enter the labour market at all.

However, the particularity of the Spanish situation in terms of disabled people integration on the labour market should not be justified in terms of wage discrimination. Thus, although there exists a negative relationship between hourly wage and reporting hampered in daily activities by a chronic or mental health problem, illness or disability, it is not statistically significant. In this way, we can notice that differences in the return attributes are more important in explaining earning differences than are differences in reporting “Hampered in daily activities”.

The political consequences of these findings are very interesting. Disabled people have to face discrimination and barriers existing in society, in particular in finding and keeping a job. Spain should change attitudes towards disabled people in employment policies.

Disabled people are at high risk of being unemployed which in many cases leads to dependence on welfare benefits. Also, it is necessary to promote and guarantee universal access to health care, education, social services, social activities, etc., in order to increase their labour market participation.

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