DISABILITY AND ABSENTEEISM:
An empirical analysis with the ECHP

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Abstract

Using data from the European Community Household Panel for Spain covering the period 1995-2001, this paper investigates the influence of disability on absenteeism reported by workers. Results show that workers with disabilities are more likely to fail to turn up to work than workers without disabilities. This finding holds even when individual's self-reported health, visits to the doctor and nights at hospital are included in the estimations. The total effect of disability on absenteeism amounts to a marginal increase of 6-10 days per year. Implications for labour policy are discussed.

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1. Introduction

When workers do not freely choose working hours and should accept a more or less 'rigid' organization of working time, absenteeism is a means to adapt effective working hours to the individuals' optimum (Brown and Sessions, 1996). Since disabilities heavily affect the distribution and the 'size' of the time budget (Livermore et al., 2000), people with disabilities will be more prone to absenteeism than the rest of the population, even after considering that they presumably face additional health problems that lead them to incur in more visits to doctors and, sometimes, nights at the hospital. In this sense, Oi (1991) refers to disability as a condition that "steals time". As people with disabilities spend more time in non-work activities (besides medical care activities), their time budget for work and leisure can change drastically. As job adaptation to disabilities is often more a desire than a reality, absenteeism might be considered for some people with disabilities as the only way to reach a better distribution of time.

Moreover, casual information suggests that employers sometimes argue that their reluctance to hire people with disabilities is due to their higher probability to be absent. If this employers' presumption were based on real facts, an eventual discrimination in hiring would be statistical. If it entailed prejudices without any connection to reality, then discrimination in hiring would be based on discriminatory tastes. Obviously, policy measures against discrimination of people with disabilities will be different depending on the type of discrimination. In the first case, information and financial incentives would be accurate policies, while in the second case sanctions and additional anti-discriminatory legal measures would be more appropriate initiatives.

In this article, we investigate whether people with disabilities exhibit more absenteeism than the rest of workers and whether other health-related variables (such as the subjective evaluation of the health state, visits to doctors and nights at hospital) have a simultaneous influence on absenteeism. In order to contrast these hypotheses, we use a panel of Spanish individuals from 1995 to 2001 extracted from the European Community Household Panel (ECHP), a yearly survey to households launched by EUROSTAT in 1994. From an empirical point of view, using panel data will allow to control for individual effects concerning specific variables potentially correlated to

absenteeism. As our absenteeism variable is a count of absence days per month, we will estimate random-effects Poisson regression models.

The contribution of this paper to the literature lies in that it sheds some light on the up-to-date neglected interest in the study of the impact of health and disability on absenteeism. Traditionally, the theoretical economic literature has focused on workers' choices about working time (using the conventional work-leisure model) and the empirical research has been mainly based on household or worker surveys, therefore examining absence-inducing factors across individuals. In this vein, studies by Leigh (1981, 1983), Allen (1984), Drago and Wooden (1992) and Winkelman (1999), among others, focus their attention on personal characteristics (such as gender or age) and firm characteristics (unionization, size, overtime, or scheduled working hours). Surprisingly enough, the economic literature (especially the theoretical one) has ignored so far the influence of the state of the individual's health on absence rates. The same is true for the potential impact of disability on absenteeism.

The remainder of the paper is as follows. In section two, we provide a review of the literature related to absenteeism and people with disabilities. Section three presents the data and describes the main variables used below. Section four carries out a descriptive analysis, providing a summarized picture of the relationships between the main variables. Section five is devoted to the econometric analysis aimed at estimating the isolated influence of disability on absenteeism. Finally, section six summarizes the main findings.

2. Background

Disadvantaged groups usually find it more difficult to compete in the labour market. People with disabilities can be specially affected by discrimination based on prejudices and a lack of accurate information in the rest of society about impairments and their consequences, as the psychological literature has explained widely (Yuker, 1988).

In all countries, people with disabilities exhibit much lower participation rates, lower wages and higher unemployment rates (Haveman and Wolfe, 2000, and Baldwin and Johnson, 1994, for the US case, and Malo and García-Serrano, 2001, and Zwinkels, 2001, for the European Union). However, information about what happens at work with people with disabilities is actually scarce. Regarding the main

objective of this article, there is only casual information that circulates among employers about the potential link between absenteeism and disability. This link is particularly relevant since, if employers think that people with disabilities are workers who fail to turn up for work more frequently than people without disabilities, they would prefer not to hire them (and, if they do it, they will pay lower wages).

Although absenteeism seems to be a very relevant issue for firms (and workers!) and gives valuable information about the industrial relations climate, economists have focused their efforts on absenteeism only in the last two decades (see Brown and Sessions, 1996, for a thorough survey). One reason to explain this growing concern is the significant quantitative importance of absenteeism on total non-worked days: the number of days lost due to absenteeism exceeds the number of days lost due to industrial disputes in many countries (see, for instance, Chaudhury and Ng, 1992, and the references therein). Furthermore, the availability of worker- or firm-based datasets containing information on absenteeism has allowed labour economists to shed some light on the relationship between absence behaviour and several economic variables.

As Brown and Sessions (1996) argue, a weakness of the theoretical economic literature on absenteeism has been to ignore the state of the individual's health. The empirical research has always recognized that health influences individual absence behaviour though. In this vein, the results by Allen (1981) and Leigh (1991) show that poor health is positively correlated with more absenteeism[1].

One exception to that ignorance is the theoretical paper by Barmby et al. (1994). They use the static neo-classical labour supply model, including an index of health or sickness (σ, which is assumed to be a random variable with probability density function $f(\sigma)$) into the utility function. Higher levels of this index represent higher levels of sickness. In this context, utility depends on consumption, leisure and the level of sickness or health. By specifying Cobb-Douglas preferences, the relative weight placed on leisure versus consumption is interpreted as the index of sickness: as the individual becomes sicker, he places relatively more weight on leisure than on consumption. Leisure is interpreted as recuperation time. Since different realisations

[1] Other works on absenteeism are Leigh (1981, 1984), Allen (1984), Dunn and Youngblood (1986), Kenyon and Dawkins (1989), Chaudhury and Ng (1992), Drago and Wooden (1992), Winkelman (1999) and Barmby (2002).

of σ alter the slope of the indifference curve (the marginal rate of substitution between consumption and leisure), it explains why the individual will attend work or not.

Obviously, the previous model does not refer to disability but to sickness. However, if we interpret σ as an index of disability, the main message remains that workers with higher values of σ will be absent more frequently. One relevant point here is whether employers are able to screen potential employees prior to recruitment in order to gauge future absence spells. In the case of people without disabilities, this can only be done having access to past records of absence. But in the case of people with disabilities, employers may adopt a view of "statistical discrimination": if they expect that this group as a whole is more absent prone, they will assign the higher probability to the next worker with disability to be hired.

However, the impact of disability on absenteeism has not been previously investigated in the economic literature. In principle, one may think that workers with disabilities may fail to turn up for work more frequently than workers without disabilities. However, this is not necessarily to be always the case. On the one hand, both groups of workers are heterogeneous, so we may think that absenteeism may be determined more by personal and job related characteristics than by the disability status of workers. On the other hand, people with disabilities differ not only in the degree of disability but also in the type of disability. This means that one would expect certain groups of workers with disability to behave in a similar fashion to workers without disability; however, other groups may fail to turn up for work more frequently due precisely to their type (and severity) of disability. In turn, this may have consequences not only for workers' absence decisions but also for the actions taken by employers, since firms can adopt measures to allow for such anticipated absences. In this sense, employers could replace a worker with disability by making temporary recruitments or rescheduling existing employees, something that will be expensive for them since it implies an adjusting of their workforce.

3. Data and main variables

The European Community Household Panel (ECHP) is a large-scale international panel survey carried out by the European Statistical Office (Eurostat) and collected yearly from 1994 to 2001. It was designed to provide fully comparable

information on the economic and life conditions of the European population (fourteen European countries). The survey is targeted at private households, collecting information on several socio-demographic issues. In this paper, we do not use the 1994 wave since the questions on disability changed slightly from the first to the second and subsequent waves. Moreover, information on the type of contract is not available for the 1994 wave. Therefore, for the sake of homogeneity, we use data for the period 1995-2001.

The ECHP questionnaire includes two questions whose answers can be used to obtain a proxy to disability:

- *Q158: Do you have any chronic physical or mental health problem, illness or disability? If Yes ➔ Q159*

- *Q159: Are you hampered in your daily activities by this chronic or mental health problem, illness or disability? Yes, severely / Yes, to some extent / No*[2]

We may assume that those individuals who answer 'yes' (severely or to some extent) to the last question can be defined as disabled persons. Of course, this is a self-evaluation, which means that it does not refer to an "objective" definition of disability. It is obvious that the classification generated by self-reporting should not agree with that brought about by the application of "objective" requisites. One the one hand, one may expect that the use of answers to a self-evaluation question brings about a over-estimation of the prevalence of disability, since individuals might be justifying their behaviour of low or no labour supply and their receipt of sickness or disability benefits. On the other hand, self-reporting may generate an infra-estimation of prevalence, if disability is considered a stigma though. Finally, the existence of biases is more likely when individuals have to provide information to the sanitary administration in order to receive benefits or to gain access to given rights than in the case of a survey that guarantees the anonymity of respondents[3].

It is worth mentioning that the disability definition included in the ECHP does correspond neither with the international definition provided by the World Health

[2] The filtering question was added in the second wave (1995). This is an additional reason to use data from 1995 onwards, since it avoids any problem related to this change in the questionnaire in the following analysis.

Organization (WHO) nor with administrative definitions (which are mainly work-based). Although the first feature reduces the comparability with other international surveys on disability, the second feature is a very positive characteristic since makes the ECHP definition closer to the WHO one, which defines disability with respect to daily activities. In accordance, figures obtained from the ECHP give an approximation to the phenomenon of disability not strictly comparable with other datasets whose questionnaires follow the international definitions but closer to them than administrative datasets[4].

Although the ECHP questionnaire allows us to define two subtypes of disability (severely hampered and only hampered to some extent), we will use only one category that consists of the aggregation of both subtypes of disability. The main reason lies in that these subtypes do not correspond to any standard subgroups of the WHO definition of disability. Moreover, the sample size corresponding to the group of those with severe disabilities (those answering 'Yes, severely') is truly short. The main effect of the proposed aggregation is that we will have a disabled population with greater heterogeneity than that presented in other definitions (especially, in comparison with administrative definitions).

Furthermore, the ECHP also allows having a measure of the individual's subjective health status, since one of the questions asks the individuals to self-report their perceived health in general. Their answers are coded in a range from 1 (very good) to 5 (very bad). This variable is potentially important for the empirical analysis, since it can be used to qualify the information provided by the disability variable. Neither all workers with disabilities have health problems than can limit their productivity, nor all workers without disabilities are sickness-free. Since health problems may potentially affect all individuals, we will include controls for this (and in interaction with disabilities) in the econometric estimations.

Regarding the variable on absenteeism (the left hand side variable in the estimations performed below), it is constructed thanks to the existence of a question in the ECHP questionnaire which is read as follows: "Please, think of the last four

[3] Several studies have tried to document and explain over- and infra-estimation generated by disability self-reporting and relating potential biases. See, *inter alia*, Chirikos and Nestel (1984), Kreider (1999) and Benítez-Silva et al. (2004).

[4] Zwinkels (2001) provides comparisons between panel data and administrative data for different European countries.

working weeks, not counting holiday weeks. How many days were you absent from work because of illness or other reasons?" In the empirical analysis, the answers to this question have been used as a non-negative count variable (ranging from 0 to 28) but also to build a dichotomous variable, taking value 1 for those reporting a positive absence rate and value 0 otherwise.

From the initial sample on Spanish individuals, we have excluded those who do not report valid information on all variables to be used in the forthcoming analysis. Therefore, after the application of this restriction, we have been left with 16,101 observations.

4. Summary statistics

Table 1 provides some summary statistics on the sample of workers used in the empirical section. In order to uncover possible relationships between absenteeism and other economic variables, the table displays the distribution of the sample of workers broken down into two groups: disabled workers and non-disabled workers. It offers the means and the standard deviations of the variables for both groups.

[TABLE 1 OVER HERE]

According to the figures from the ECHP presented in the table, the mean of absent days is clearly higher for people with disabilities (5 days) in comparison with people without disabilities (0.7 days). One important and usual feature related to the absenteeism data is that its distribution is highly skewed due to the very important concentration in zero days. To look at this issue and to examine how it differs among groups of workers classified according to their disability status, we have constructed Table 2, which provides the distribution of absenteeism by disability. The information shown corroborates the previous remark: the majority of workers report no absenteeism, although there are significant differences between people without disabilities (90 percent) and people with disabilities (65 percent). Moreover, the data indicate that, although people with moderate disability exhibit higher absenteeism than people without disabilities, the large absenteeism figures corresponding to people with disabilities are mainly due to those with severe disability (of this group, 63 percent report 8 or more days of absenteeism).

[TABLE 2 OVER HERE]

Therefore, the raw information provided so far suggests that there is a clear positive correlation between absenteeism and disability. However, this association might be related to the fact that people with disabilities spend more time in visits to doctors and/or exhibit a poor health state than the rest of people. On the one hand, it is true that on average people without disabilities report 3 visits to any doctor (general or specialist) in the past 12 months, while in the case of people with disabilities it amounts to 12 (see Table 1). To investigate further this relationship, we have estimated the Pearson correlations of the visits to a general practitioner (0.313), a specialist (0.259), and both (0.348) with absent days. Although they are positive and statistically significant, the Pearson coefficients do not show a very strong association.

On the other hand, the (subjective) health state is clearly worse for people with disabilities: 32 percent of them report a bad health state, while this proportion is only 1 percent for those without disabilities. Moreover, we have considered nights spent at hospitals in the last 12 months as an "objective" indicator of bad health periods. Since we expect that the visits to the doctor do not only depend on the individual decisions (for instance, women go to the doctor more frequently due to problems related to the rest of the family, mainly children), nights spent at hospitals would be a more objective measure of bad health periods because they would be related to medical decisions external to the individual. The figures in Table 1 show that people with disabilities spend more nights at hospitals than the rest of people (1.8 versus 0.3).

Therefore, people with disabilities (in particular, those severely disabled) exhibit higher absenteeism, go four times more to the doctor (either general or specialist) and suffer a poorer health state. Of course, higher absenteeism might be the result of disabilities, of the time spent to go to the doctor, of a bad health state, or of the joint effects of all these variables. We will try to disentangle these effects with the econometric procedure carried out in the next section.

Before doing that, we turn to Table 1 to present the remainder of the (independent) variables to be used later and to look at how they distribute across the two categories of workers considered. These variables have been grouped into four categories. First, there are several personal characteristics: age, age at the beginning of the working life, gender, marital status, and attained educational level. Second, we also have some firm characteristics for which the dataset provides information:

institutional sector (public or private) and industry affiliation. Third, there is several job characteristics: occupation, job category (supervisor, intermediate, or simple employee), working hours, full-time/part-time status, and type of contract. Finally, two additional variables on (subjective) job satisfaction with working conditions and on whether the individual received sickness/invalidity benefits (the latter refers to the previous year of the survey, therefore it may be considered a proxy of the recent history of sickness or disability recognized by the Social Security)[5]. The sample data suggest that, in comparison with the rest of the working population, people with disabilities are on average older, have a higher educational attainment, and are more present in low-skilled manual occupations, in jobs with fixed-term contracts, in private firms and in the agriculture sector.

5. Empirical specification and results

The dependent variable used in our analysis is a non-negative count variable, since each observation is the number of days the individual has failed to turn up to work. Therefore, we assume that a Poisson-like process has generated it[6]. As the dataset is a panel, we have estimated Poisson and Negative Binomial regressions with random effects[7]. The tests for the estimated Negative Binomial regressions show that the parameters related to the heterogeneity generated by the random effects were not significant[8]. Thus, we only report the results obtained with the random-effects Poisson models[9], which typically correspond to the estimation of the following equation:

$$\ln \lambda_{it}=\beta' X_{it} + \varepsilon_i$$

where ε_i is a random effect for the ith group (the same in every period), and $\exp(\varepsilon_i)$ has a gamma distribution with parameters (θ, θ). Thus, $E[\exp(\varepsilon_i)]=1$ and $Var[\exp(\varepsilon_i)]=1/\theta=\alpha$.

[5] The questionnaire does not allow to disaggregate sickness benefits (a short-term income transfer) from invalidity or disability pensions (a long-term income transfer). Therefore, although this variable provides a useful control in the estimation procedure, it is difficult to properly interpret its coefficient.

[6] Count data models have been applied previously to estimate the determinants of absenteeism (for instance, Delgado and Kniesner, 1997, and Winkelmann, 1999). For a description of count data models, see Winklemann and Zimmerman (1995) and Cameron and Trivedi (1998).

[7] The estimation of (conditional) fixed effects models reduces the sample in around 10,000 observations.

[8] In these estimations, random and fixed effects refer to the distribution of the dispersion parameter and not to the usual Xb term in the model.

[9] In general, for a discrete random variable Y with observed frequencies $y_i=1,\ldots,n$, where y_i is nonnegative integer count and regressors X_i, the Poisson model assumes that $Prob(Y=y_i) =\exp(\lambda_i)(\lambda_i)^{y_i}(y_i!)^{-1}$, and log $\lambda_i=\beta' X_i$ (or, alternatively, $\lambda_i=\exp(\beta' X_i)$). In the Poisson model, λ_i corresponds to the mean and the variance of the dependent variable, Y: $E[Y]= \lambda_i$.

Therefore, a test on $\alpha=0$ is, in fact, a test on the statistical significance of random effects. In all estimations, we obtain significant estimates for the parameter α.

Table 3 provides a summary of the estimate results for different specifications. In fact, it displays the coefficients corresponding to the disability variable and to the interactions of disability with the subjective health state, with visits to the doctor and with nights spent at the hospital. The independent variables included in the estimations are the individual, job and firm characteristics that can be constructed from the information provided in the ECHP and described in the previous section.

[TABLE 3 OVER HERE]

The estimate results show that the coefficient of the disability variable is always positive and statistically significant. This means that disability increases an individual's absence days. The marginal effect indicates that workers with disability fail to turn up to work 0.5-0.8 days per month more than workers without disability, on average. In other estimations without any interaction not included here, the marginal effect of disability amounts to 1.5 days. If we distinguish between severe and moderate disability[10], the effect of both is positive, being the magnitude of the impact of suffering severe disabilities on absenteeism around two days and of suffering moderate disabilities around 0.5 days.

As expected, the interactions of suffering disabilities with bad subjective health, visits to the doctor and nights spent at hospital increase absenteeism, but these effects are rather small: they never reach 0.1 additional absence days, with the exception of the interaction of disability with bad health. This interaction brings about an effect very similar in size to the isolated effect of disability on absenteeism. Anyway, although we find that people with disabilities who go to the doctor (or who spend more nights at hospital) report higher absenteeism, these effect are relatively small, being the most important those related to the disability itself and to the interaction of bad health with disability.

To fully appreciate the joint effect of disability (the corresponding dummy plus interactions), we have estimated the predicted absence days for the sub-sample of people with disabilities and for the sub-sample of the rest of population. These predictions have been obtained for all individuals. Table 4 shows the means, standard

[10] Again, these estimations are not included here, but they are available upon request.

deviations, minima and maxima for the five Poisson models[11]. The predicted average of absence days for people with disabilities is 3 while for people without disabilities is 0.8 days. Although this difference is lower than that for observed figures (5 and 0.7, respectively, in Table 1), the total effect of disability on absenteeism is relevant even discounting the effect of the rest of variables.

[TABLE 4 OVER HERE]

Anyway, even without considering interactions, disability increases absence days in the range of 0.5 to 0.8 days per month. This is a confirmation of the usual firms' presumption that people with disabilities will be absent more frequently because of their disabilities (and not simply because they go more frequently to the doctor or spend more nights at hospitals). This effect amounts to a range of 6 to 10 days on annual base. If we consider that the cost of absenteeism for a firm is a worker's substitute earning the same wage (which is only a rough approximation), the additional cost of hiring a person with disabilities ranges from 25 to 30 percent of the monthly wage per year. Note that this is not a fixed cost assumed at the beginning of the work contract, but a cost per year for the whole life of the contract.

Therefore, this effect is not negligible and it should be considered in any public policy trying to promote labour market participation for people with disabilities. If firms anticipate correctly this effect of disability on absenteeism, the expected results will be lower wages for people with disabilities and/or lower hiring probabilities for this group of workers. Since our results provide information on the size of this phenomenon for the firm (6-10 days per year), any financial incentive for hiring people for disabilities should be at least enough to cover this loss, not only at the moment of hiring but continuously during the life of the work contract.

Furthermore, these results show one of the sources of statistical discrimination for these workers, since the effect on absenteeism exists even if some given individuals do not exhibit higher absenteeism due to their disabilities. However, they will be judged by the mean behaviour of people of disabilities and not by their individual behaviour, because of the informational limitations on the part of employers at the moment of hiring.

The findings related to other variables included in the estimations are worth to be commented. These are shown in Table 5, which displays the estimate results

[11] We have obtained these predictions assuming that the random effects are equal to zero.

corresponding to the model 4 in Table 3. Regarding the variables capturing personal characteristics, the results are not different from what was expected. First, absenteeism and age are positively correlated: the number of absent days is lower for the youngest workers and larger for the oldest ones. Thus, the older the worker, the higher the number of days lost due to absenteeism. Similarly, in line with what the empirical literature on absenteeism has found (Leigh, 1983; Dunn and Youngblood, 1986), the level of absenteeism of women is higher than that of their male co-workers. In fact, married workers are more absent than their non-married counterparts. These findings may be reflecting that women (with dependent children) are more sensitive to family needs, thus being more likely to be absent than men. Finally, workers with tertiary education are less absent than workers with secondary education (absenteeism is also lower for workers with primary or no studies).

[TABLE 5 OVER HERE]

Job and firm characteristics are deemed to be significant predictors of absenteeism. First of all, the institutional sector appears to be relevant to explain the number of days lost due to absenteeism: workers in the private sector are absent 0.12 days per month less than workers in the public sector. This occurs after controlling for industry and occupation. Job characteristics related to working time and the type of contract also affect the number of absence days though: individuals reporting longer working weeks and holding a permanent contract fail to attend work more days. These effects agree with previous studies showing that absenteeism is used to adjust effective working time to the optimum time desired by individuals (Brown and Sessions, 1996) and that workers who enjoy a better employment security are more likely to be absent (Jimeno and Toharia, 1996; Engellandt and Riphahn, 2005). The hierarchical position is also relevant, since working as simple employee (not as supervisor or intermediate worker) increases absence days.

Finally, we have included a variable that captures the fact of receiving sickness/invalidity benefits and another one regarding the degree of job satisfaction with working conditions. On the one hand, we find that receiving sickness/invalidity benefits increases absenteeism. As Brown and Sessions (1996) show, there is wide empirical evidence documenting the effect of sickness benefits on longer absences. If we consider that disability pensions usually exert a detrimental effect on labour market participation (Bound and Burkhauser, 1999, for the US case, and Malo, 2004,

for Spain), a positive effect of receiving sickness or invalidity benefits on absenteeism is expected. On the other hand, when workers are dissatisfied with their working conditions, one way of expressing their discontent may be not attending work. This would cause a negative effect on absenteeism, indicating that more dissatisfied workers are absent more days. In terms of the model of Steers and Rhodes (1978), workers who lack motivation to attend incur in more "avoidable" absence. This is precisely what we find in the estimations[12].

6. Conclusions

This paper has investigated the influence of disability (and health) on absenteeism reported by workers. This is a neglected branch of the economic literature on absenteeism so far, so our contribution has been to try to shed some light on it. We have found that disability increases absenteeism directly and in interaction with (subjective) bad health, visits to the doctor and nights spent at hospital. However, with the exception of the interaction with bad health, those interactions have a relatively small effect on the number of absence days. The total marginal effect of disability on absenteeism (evaluated at the mean of the variables in interaction) ranges from 6 to 10 additional absence days per year. The relevant point here is that the firm will incur in these costs during the whole life of the work contract and not only as a fixed cost at the beginning of the contract.

The interest of these results is twofold. On one hand, we provide new evidence on the labour market behaviour of people with disabilities. While there is a substantial literature about their lower probability of being economically active and their wage discrimination with respect to people without disabilities, studies focusing on the behaviour at work of people with disabilities are very rare. In fact, up to our knowledge, this is the first research work in economics that investigates the relationship between absenteeism and disability.

[12] In other estimations not shown, we included workers' satisfaction with respect to seven domains of work: earnings, security, work type, hours, working time, working conditions, and commuting distance. Three indicators (those relating to earnings, working conditions and commuting distance) were significant and negatively correlated with absenteeism, being the results for working conditions the strongest in all estimations. These results are available upon request.

On the other hand, the results shed light on the sources of statistical discrimination of people with disabilities and provide empirical evidence useful to discuss about the amount of hypothetical economic incentives to firms to be compensated (at least partially) for the impact of disabilities on absenteeism and, thus, productivity. Since disability increases absenteeism, when firms anticipate this effect in the hiring process, the discrimination suffered by people with disabilities due to this reason is statistical and not based on discriminatory tastes. Therefore, informational and financial incentives measures are the more appropriate interventions in the labour market to mitigate this source of discrimination, which causes lower hiring probability and lower wages for people with disabilities. Informational measures are needed, since different disabilities bring about presumably diverging effects on absenteeism and firms should have accurate, objective information on the existence of this heterogeneity. The database used in this study has important limitations to account for this heterogeneity; even so we have documented that severe disabilities increases absenteeism two additional days per month (almost one month per year). Specialized labour market intermediation services may be very useful to cover this task, and our results support the promotion of this type of employment services. Furthermore, these results suggests that financial incentives to hire people with disabilities should not be a lump-sum transfer to the firm but a periodical transfer, since the higher cost due to absenteeism is not a fixed one. Finally, the estimate results obtained in our analyses also provide a minimum amount for financial incentives to hire people with disabilities: these transfers should cover at least the cost of 6 to 10 absence days per year.

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Table 1. Descriptive statistics. ECHP 1995-2001 (Spain)

Variable	**People without disabilities**		**People with disabilities**	
	Mean	**St. Dev.**	**Mean**	**St. Dev.**
Absence days per month	0.70	3.41	5.34	9.71
Subjective health state (1=Bad)	0.01	0.11	0.32	0.47
Number of visits to a general practitioner (past 12 months)	1.94	3.53	7.20	9.78
Number of visits to a medical specialist (past 12 months)	1.05	2.92	4.37	7.03
Number of vistis to any doctor (past 12 months)	3.00	5.31	11.58	13.58
Number of nights spent in hospital (past 12 months)	0.34	2.70	1.81	6.55
Age: 16-24	0.07	0.26	0.03	0.17
Age: 25-34	0.30	0.46	0.16	0.37
Age: 35-44	0.31	0.46	0.26	0.44
Age: 45-54	0.23	0.42	0.32	0.47
Age: 55-64	0.09	0.28	0.23	0.42
Age at which the person started his/her working life	18.66	5.30	17.56	7.72
Gender (1=Female)	0.36	0.48	0.36	0.48
Civil Status (1=Married)	0.67	0.47	0.74	0.44
Educational level: Primary or no studies	0.33	0.47	0.14	0.34
Educational level: Secondary	0.20	0.40	0.15	0.36
Educational level: University	0.47	0.50	0.71	0.45
Occupation: Legislators, senior officials and managers	0.03	0.17	0.01	0.12
Occupation: Professionals	0.15	0.35	0.08	0.27
Occupation: Technicians and associate professionals	0.12	0.32	0.05	0.22
Occupation: Clerks	0.11	0.32	0.06	0.25
Occupation: Service workers and shop and market sales workers	0.13	0.34	0.15	0.35
Occupation: Skilled agricultural and fishery workers	0.02	0.13	0.04	0.18
Occupation: Craft and related trades workers	0.19	0.39	0.25	0.43
Occupation: Plant and machine operators and assemblers	0.11	0.31	0.09	0.28
Occupation: Elementary occupations	0.15	0.35	0.27	0.45
Working hours (per week)	40.41	8.92	39.99	9.90
Full time (1=Yes)	0.94	0.24	0.90	0.30
Open-ended contract (1=Yes)	0.69	0.46	0.61	0.49
Job status (1=Supervisory or intermediate)	0.27	0.44	0.22	0.41
Sector: Agriculture	0.04	0.19	0.10	0.31
Sector: Industry	0.34	0.47	0.36	0.48
Sector: Services	0.62	0.49	0.53	0.50
Institutional Sector (1=Private firm)	0.74	0.44	0.80	0.40
Satisfaction level with working conditions (a)	4.22	1.32	3.99	1.34
Sickness/invalidity benefits (1=Yes)	0.01	0.09	0.10	0.29
N	15,450		651	

Notes: (a) This variable ranges from 1 (not satisfied) to 6 (fully satisfied).

Table 2. Distribution of absenteeism by disability status. ECHP 1995-2001 (Spain).

Absenteeism (days)	Without disabilities	With disabilities	Moderate disability	Severe disability
0	90.3	65.1	72.7	28.6
1	3.1	5.1	5.8	1.8
2	1.4	2.0	2.4	-
3	0.9	1.8	1.9	1.8
4	0.4	1.4	1.1	2.7
5	0.5	1.8	1.9	1.8
6	0.1	0.5	0.6	-
7	0.4	0.8	0.9	-
8 or more	2.8	21.5	12.8	63.4
N	15,450	651	539	112

Table 3. Marginal effects of disability variables on absence days estimated from the random-effects Poisson models. ECHP 1995-2001 (Spain).

	Disability	**Bad Health* Disability**	**Visits to a general pract.* Disability**	**Visits to a specialist* Disability**	**Visits to any doctor* Disability**	**Nights at hospital* Disability**
Model 1	0.844	0.886				
Model 2	0.598	0.761	0.014			
Model 3	0.635	0.771		0.021		
Model 4	0.503	0.696			0.123	
Model 5	0.702	0.746				0.026

Table 4. Predicted average effect of disability on absence days (evaluated at the mean of the rest of variables, including interactions with disability).

		Mean	**Std. Dev.**	**Min**	**Max**
Model 1	With disabilities	3.2	2.6	0.3	16.0
	W/O disabilities	0.8	0.5	0.1	6.9
Model 2	With disabilities	3.0	2.9	0.3	31.1
	W/O disabilities	0.8	0.5	0.1	6.6
Model 3	With disabilities	3.1	3.4	0.3	62.7
	W/O disabilities	0.8	0.5	0.1	6.8
Model 4	With disabilities	3.0	2.9	0.3	30.4
	W/O disabilities	0.8	0.5	0.1	6.6
Model 5	With disabilities	3.1	3.9	0.3	56.4
	W/O disabilities	0.8	0.5	0.1	6.7

Table 5 Estimates results of a random-effects Poisson regression model on absence days per month. ECHP 1995-2001 (Spain).

Variables	**Coef.**	**Std. Err.**	**z**	**dy/dx[(b)]**	**Std. Err.**	**z**
Age: 16-24	-0.33	0.081	-4.09	-0.205	0.045	-4.58
Age: 25-34	-0.219	0.045	-4.89	-0.149	0.030	-4.90
Age: 45-54	-0.157	0.045	-3.49	-0.107	0.030	-3.59
Age: 55-64	0.55	0.071	7.70	0.494	0.083	5.95
Age at which the person started his/her working life	-0.039	0.009	-4.33	-0.028	0.007	-4.24
Gender (1=Female)	0.585	0.107	5.45	0.456	0.094	4.86
Civil Status (1=Married)	0.614	0.057	10.85	0.398	0.040	9.88
Educational level: Primary or no studies	-0.374	0.05	-7.42	-0.250	0.033	-7.49
Educational level: University	-0.628	0.042	-14.85	-0.447	0.038	-11.80
Occupation: Legislators, senior officials and managers	0.763	0.135	5.65	0.796	0.204	3.91
Occupation: Professionals	0.004	0.087	0.05	0.003	0.062	0.05
Occupation: Technicians and associate professionals	-0.035	0.057	-0.61	-0.024	0.039	-0.62
Occupation: Service workers and shop and market sales workers	0.024	0.07	0.35	0.017	0.051	0.34
Occupation: Skilled agricultural and fishery workers	0.328	0.107	3.07	0.274	0.105	2.62
Occupation: Craft and related trades workers	0.375	0.072	5.22	0.301	0.066	4.57
Occupation: Plant and machine operators and assemblers	0.148	0.073	2.02	0.111	0.059	1.90
Occupation: Elementary occupations	0.229	0.068	3.35	0.176	0.057	3.08
Working hours (per week)	0.018	0.002	9.62	0.013	0.001	8.72
Full time (1=Yes)	-0.315	0.065	-4.83	-0.258	0.062	-4.15
Open-ended contract (1=Yes)	0.147	0.035	4.22	0.102	0.024	4.21
Job status (1=Supervisory or intermediate)	-0.187	0.033	-5.69	-0.127	0.022	-5.76
Sector: Agriculture	-0.069	0.094	-0.73	-0.048	0.063	-0.76
Sector: Services	-0.159	0.049	-3.23	-0.115	0.037	-3.13
Institutional Sector (1=Private firm)	-0.161	0.052	-3.11	-0.119	0.040	-2.98
Satisfaction level with working conditions [(a)]	-0.049	0.008	-6.01	-0.035	0.006	-5.84
Sickness/invalidity benefits (1=Yes)	0.219	0.048	4.53	0.174	0.043	4.03
Disabilities (1=Yes)	0.545	0.045	11.99	0.503	0.058	8.71
Interaction: Health state*Disabilities (1=Bad health and disability)	0.688	0.051	13.36	0.696	0.079	8.83
Interaction: Visits to any doctor*Disabilities	0.018	0.001	12.47	0.013	0.001	10.74
Constant	0.016	0.211	0.07			
/lnalpha	1.943	0.037				
Alpha	6.979	0.258				

Notes:
(a) This variable ranges from 1 (not satisfied) to 6 (fully satisfied).
(b) Marginal effects have been estimated assuming that random effects are equal to zero.